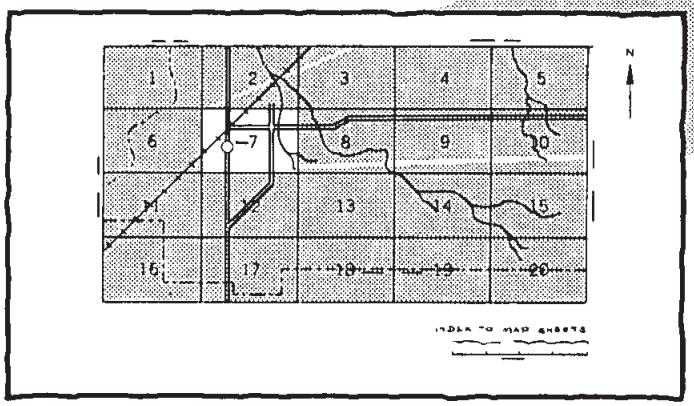
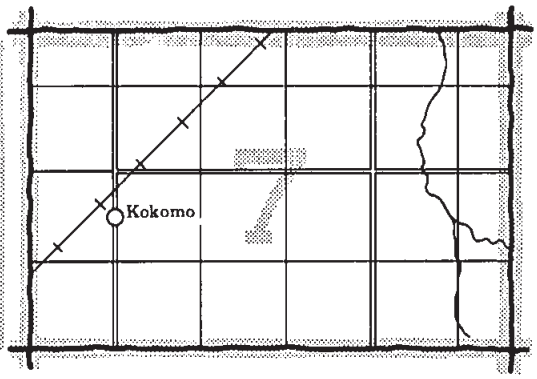
SOIL SURVEY OF
WALKER COUNTY, TEXAS

United States Department of Agriculture, Soil Conservation Service and Forest Service
in cooperation with the Texas Agricultural Experiment Station

HOW TO USE

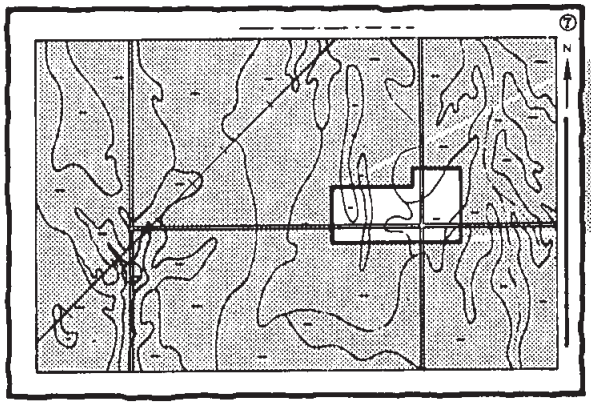
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

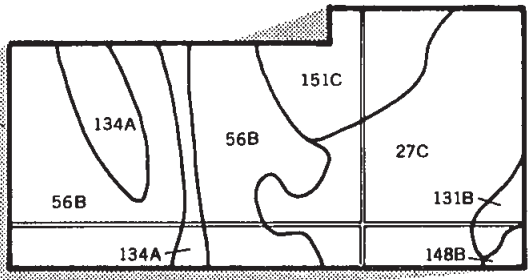




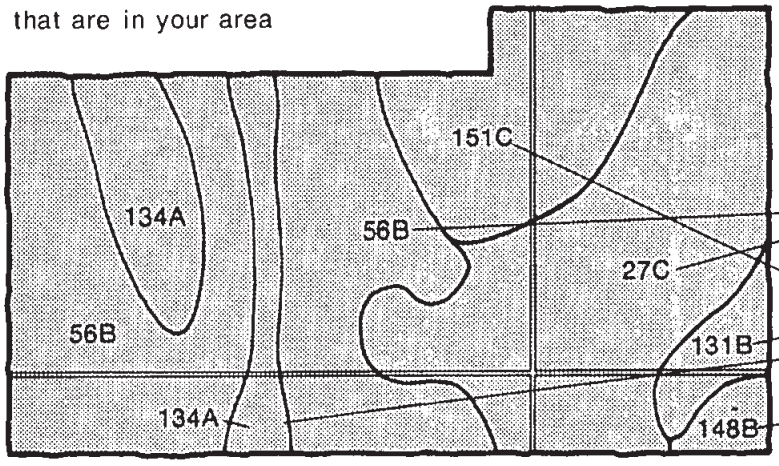
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area

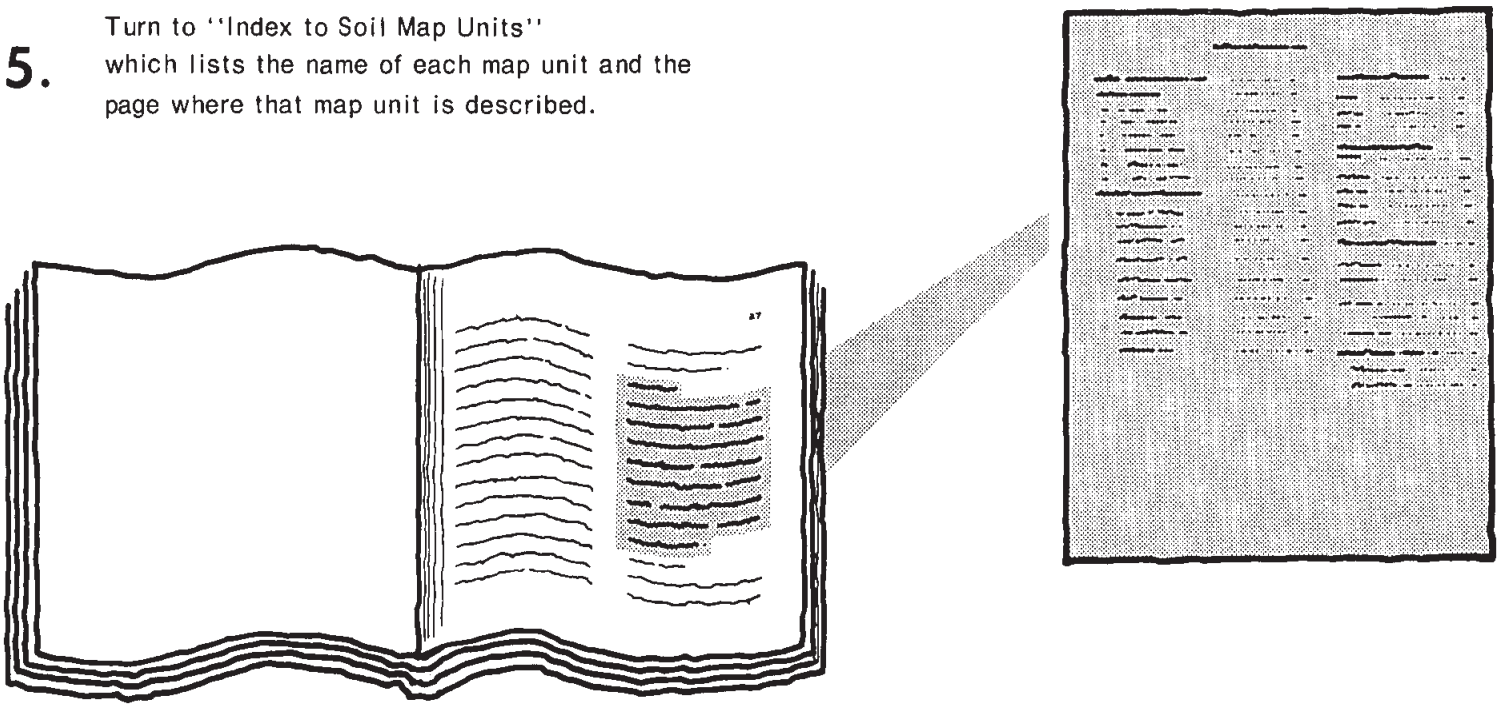


Symbols

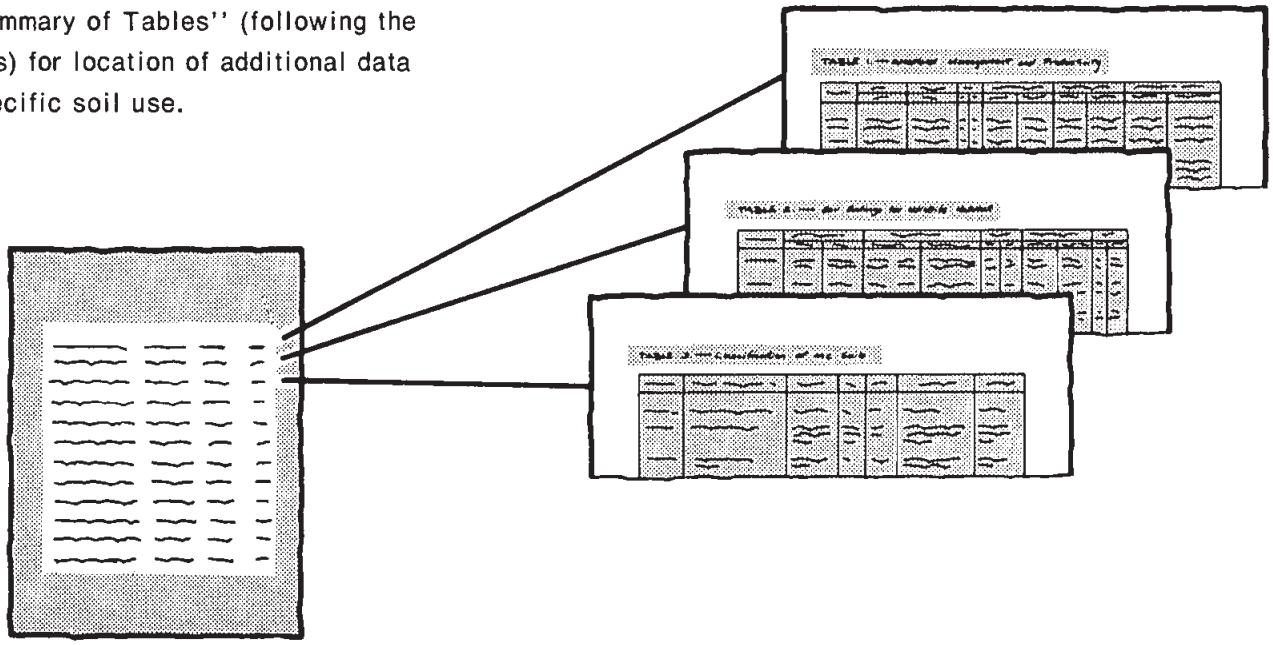
27C
56B
131B
134A
148B
151C

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1967-73. Soil names and descriptions were approved in 1975. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1973. This survey was made cooperatively by the Soil Conservation Service and Forest Service and the Texas Agricultural Experiment Station. It is part of the technical assistance furnished to the Montgomery-Walker Soil and Water Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Improved pasture in an area of Elmina association, gently undulating.

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Issued May 1979

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Summary of Tables

Foreword

The Soil Survey of Walker County, Texas contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

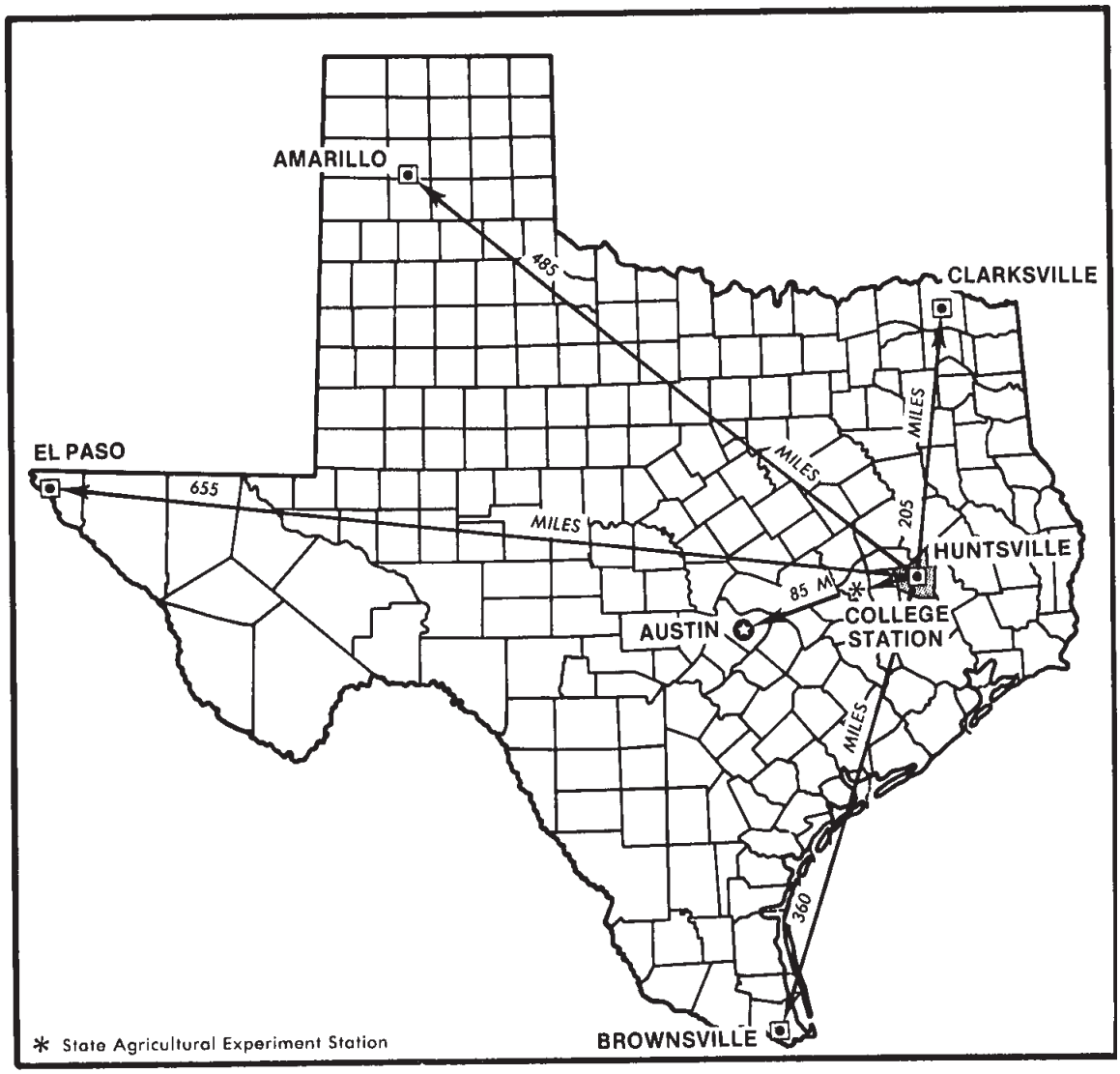
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

George C. Marks
State Conservationist
Soil Conservation Service



Location of Walker County in Texas.

SOIL SURVEY OF WALKER COUNTY, TEXAS

By William R. McClintock, Jr., Joseph J. Castille, and Michael Stewart, soil scientists, Soil Conservation Service, and L. E. Andrew, soil scientist, Forest Service

United States Department of Agriculture, Soil Conservation Service and Forest Service, in cooperation with the Texas Agricultural Experiment Station

WALKER COUNTY is in the southeastern part of Texas. The total area is 505,600 acres, or 790 square miles. The county is irregularly shaped and is about 30 miles wide and 38 miles long.

Walker County is mainly in the Land Resource Areas of the East Texas Timberlands and the Claypan Area. Some minor areas are in the Blackland Prairie.

The topography is undulating to gently rolling and generally slopes to the southeast. The elevation ranges from about 230 to 470 feet.

The county is mostly timberland. About 72 percent is pine timber, 21 percent pasture, 3 percent urban or water areas, 2 percent cropland, and 2 percent range.

The soils formed under timber and grass vegetation. Those formed under timber are light-colored fine sandy loams or loamy fine sands, and those formed under grass are dark colored fine sandy loams and clays.

General nature of the county

Walker County, named for S. H. Walker of the Texas Rangers, was established in 1846. The total population is approximately 27,680. Huntsville, a town of about 17,600, is the county seat. It was founded as an Indian trading post in 1836, the year of Texas independence. Other towns in the county are New Waverly, Dodge, Phelps, and Riverside.

The Sam Houston National Forest covers 131,100 acres in Walker County. Of this acreage, about 41 percent is owned by the Forest Service.

Timber products, such as saw logs, round pulpwood, and posts, are the major source of income. Livestock, grazed on timberland as well as pastureland, is a major source of income for many landowners. Wildlife is a source of income for some landowners. Crushed rock is a source of income for a limited number of landowners in the county.

Climate

Walker County is hot in summer and cool in winter, except when an occasional surge of cold air causes a sharp drop in temperature. Rainfall is uniformly distributed throughout the year. Snowfall is infrequent. Total annual precipitation is normally adequate for cotton, feed grains, and small grains.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Huntsville, Texas, for the period 1951 to 1975. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 51 degrees F, and the average daily minimum temperature is 41 degrees. The lowest temperature on record, which occurred at Huntsville on February 2, l952, is 7 degrees. In summer the average temperature is 82 degrees, and the average daily maximum temperature is 94 degrees. The highest recorded temperature, which occurred on August 13, 1962, is 107 degrees.

Growing degree days, shown in table 1, are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 24 inches, or 55 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 7.09 inches at Huntsville on September 14, 1974. Thunderstorms occur on about 70 days each year, and most occur in summer.

Snowfall is rare; in 75 percent of the winters there is no measureable snowfall. In 20 percent, the snowfall, usually of short duration, is more than 2 inches. The

heaviest 1-day snowfall on record was more than 3 inches.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The percentage of possible sunshine is 65 in summer and 55 in winter. The prevailing wind is from the south-southeast. Average windspeed is highest, 9 miles per hour, in spring.

Tornadoes and severe thunderstorms occur occasionally. These storms are local and of short duration, and the pattern of damage is variable and spotty.

Climatic data in this section were specially prepared for the Soil Conservation Service by the National Climatic Center, Asheville, North Carolina.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The soils in the survey area vary widely in their potential for major land uses. Table 4 shows the extent of the map units shown on the general soil map and gives general ratings of the potential of each, in relation to the other map units, for major land uses. Soil properties that pose limitations to the use are indicated. The ratings of soil potential are based on the assumption that practices in common use in the survey area are being used to overcome soil limitations. These ratings reflect the ease of overcoming the soil limitations and the probability of soil problems persisting after such practices are used.

Each map unit is rated for *cultivated farm crops, pasture woodland, urban use,* and *recreation areas*. Cultivated farm crops are those grown extensively by farmers in the survey area. Pasture is land planted to improved grasses for grazing. Woodland refers to land that is producing either trees native to the area or introduced species. Urban uses include residential, commercial, and industrial developments. Recreation areas include campsites, picnic areas, ballfields, and areas that are used for nature study and as wilderness.

Map unit descriptions

The eight soil map units in Walker County are described in the following pages.

1. Depcor-Annona-Huntsburg

Deep, sandy and loamy, gently undulating to gently rolling soils on uplands

This map unit makes up about 40 percent of this county. It is about 30 percent Depcor soils (fig. 1), 25 percent Annona soils, 15 percent Huntsburg soils, and 30 percent soils of minor extent. Slopes are 1 to 10 percent.

Depcor soils are on convex side slopes between the ridgetops and in the more sloping areas adjacent to streams. Typically the surface layer is very friable, brown fine sandy loam about 5 inches thick. Between 5 and 26 inches is light yellowish brown loamy fine sand. Below this to a depth of 80 inches is firm, mottled brown sandy clay loam. The soil is very strongly acid throughout.

Annona soils are on convex side slopes in positions similar to those of Depcor soils. Typically the surface layer is friable, slightly acid, brown fine sandy loam about 4 inches thick. Below this to a depth of 80 inches is very firm, mottled clay that ranges from red and strongly acid in the upper part to yellowish brown and moderately alkaline in the lower part.

Huntsburg soils are on broad interstream divides on plane to concave side slopes and in less sloping areas adjacent to the streams. Typically the soil is very friable, brown loamy fine sand to a depth of 14 inches. Below this to a depth of 72 inches, it is firm or very firm, mottled clay. It ranges from slightly acid in the upper part to very strongly acid in the lower part.

Also in this unit are Ferris, Gowker, Gunter, Kanebreak, Landman, Leson, Lufkin, and Redco soils. The gently sloping clayey Ferris, Leson, and Redco soils are on uplands. The sandy Gunter soil is on ridgetops and knolls. The sandy Landman and loamy Lufkin soils are on low stream terraces. Gowker and Kanebreak soils are on narrow bottom lands and are frequently flooded.

This unit is used mainly for timber production and woodland grazing. It includes small livestock farms and some urban areas that are mainly residential.

This unit has high potential for pine trees. The soil depth, slope, and drainage are all desirable for timber production. The potential is high for pasture, but it is only medium for cultivated crops because of wetness. The potential is low for urban development. The soils are not suitable for septic tank absorption fields because effluent percolates slowly through the clayey lower layers. The layers also shrink and swell with changes in moisture content causing foundation problems for dwellings, streets, and roads. The potential is low for recreation because of the sandy surface layer and the wetness. It is high for woodland wildlife.

2. Falba-Elmina-Arriola

Moderately deep and deep, sandy and loamy, nearly level to sloping soils on uplands

This map unit makes up about 38 percent of the county. It is about 33 percent Falba soils (fig. 2), 11 percent Elmina soils, 7 percent Arriola soils, and 49 percent soils of minor extent. Slopes are 1 to 8 percent.

Falba soils occupy large areas, in many places extending from drain to drain. The upper 7 inches is very friable, brown and grayish brown fine sandy loam. Between 7 and 33 inches is very firm, grayish brown clay and light brownish gray sandy clay loam. Below this to a depth of 55 inches is very pale brown, tuffaceous fine sandstone. The soil is strongly acid in the upper 7 inches and very strongly acid below.

Elmina soils are on convex slopes in the highest positions on the landscape. To a depth of 32 inches the soil is very friable, light brownish gray and mottled very pale brown loamy fine sand. Between 32 and 52 inches is very firm, mottled grayish brown and brownish gray clay. Below this to a depth of 60 inches is strongly cemented sandstone. The soil is strongly acid in the upper part and very strongly acid in the lower part.

Arriola soils are on convex slopes at an intermediate level on the landscape. The soil is friable, pale brown and light yellowish brown fine sandy loam in the top 9 inches. Between 9 and 38 inches is very firm, mottled dark red and gray clay. Below this to a depth of 50 inches is light brownish gray siltstone. The soil is slightly acid in the upper 9 inches and very strongly acid below.

Also in this unit are Arol, Gowker, Kanebreak, Kaufman, Kershaw, Leson, Lufkin, and Redco soils. The loamy Arol soil occupies an intermediate level on the landscape. Kaufman, Kanebreak, and Gowker soils are on narrow stream bottoms and are frequently flooded. The sandy Kershaw soil is on ridgetops. The loamy Lufkin soil is on stream terraces. The clayey Leson and Redco soils are on river terraces and at intermediate positions on the landscape.

This unit is used mainly for pasture. Livestock farming is the principal enterprise. The unit includes several small communities.

This unit has low potential for pasture, cultivated crops, and pine timber because the soils are droughty. The potential is low for urban use because the soil shrinks and swells with changes in moisture content and water moves through the soil slowly. The potential is low for recreation because of the slow permeability and the wetness. It is medium for both openland and woodland wildlife.

3. Ferris-Annona-Houston Black

Deep, loamy and clayey, nearly level to sloping soils on uplands

This map unit makes up about 6 percent of the county. It is about 40 percent Ferris soils (fig. 3), 20 percent Annona soils, 15 percent Houston Black soils, and 25 percent soils of minor extent. Slopes are 0 to 8 percent.

Ferris soils are on side slopes between the ridges and the drains. The surface layer is firm, dark gray clay about 6 inches thick. From 6 to 47 inches is firm, light gray clay mottled with brownish yellow or reddish yellow. The underlying material to a depth of 70 inches is firm, light gray clay mottled with brownish yellow. The soil is moderately alkaline throughout.

Annona soils are on convex ridgetops. The surface layer is friable, slightly acid, brown fine sandy loam about 4 inches thick. Below this to a depth of 80 inches is very firm clay that ranges from red and strongly acid in the upper part to brown and moderately alkaline in the lower part.

Houston Black soils are on broad interstream divides. The surface layer is very firm, moderately alkaline, black clay about 27 inches thick. From 27 to 45 inches is very firm, moderately alkaline, very dark gray clay. The underlying material to 65 inches is very firm, moderately alkaline, gray clay.

Also in this unit are Depcor, Gowker, Huntsburg, Kanebreak, Kaufman, Leson, Lufkin, Redco, and Trinity soils. The clayey Leson and Redco soils are in gently sloping areas. Depcor, Huntsburg, and Lufkin soils, which are loamy sands, are closely associated with Annona soils. Gowker, Kanebreak, Kaufman, and Trinity are frequently flooded soils on narrow stream bottoms.

The unit is used mainly as pasture. Livestock farming is the chief enterprise. There is a small amount of urban land.

This unit has only medium potential for pasture and cropland because it is erodible. It has low potential for woodland because the soils are droughty. It has low potential for urban use because the soils shrink and swell with changes in moisture content and water moves slowly through the soils. The potential is low for recreational use because the soils are too clayey. The potential is medium for openland wildlife.

4. Kaufman-Gowker

Deep, loamy and clayey, nearly level soils on bottom lands

This map unit makes up 6 percent of the county. It is about 45 percent Kaufman soils, 25 percent Gowker soils, and 30 percent soils of minor extent. Slopes are 0 to 1 percent.

Kaufman soils are in the nearly level backwater areas. The surface layer is very firm, black clay about 30 inches thick. Below this to a depth of 65 inches is very firm, dark gray clay. The soil ranges from slightly acid in the surface layer to medium acid and neutral below.

Gowker soils are adjacent to streams. The surface layer is firm, very dark gray clay loam about 9 inches thick. Between 9 and 44 inches is firm, black clay loam and very firm, mottled, dark gray clay. Below this to a depth of 60 inches is firm, grayish brown sandy clay loam mottled with reddish brown. The soil is slightly acid in the surface layer and slightly acid and neutral below.

Also in this unit are Gladewater, Kaman, Kanebreak, Nugent, and Trinity soils. The Gladewater, Kaman, and Trinity are associated clayey soils on bottom land. The loamy Kanebreak soils are on bottom land near stream channels and wide river or stream bends. The sandy Nugent soils occur in former stream channels.

This unit is used for cultivated crops, pasture, and hardwood timber. Cultivation is limited to the area enclosed by levees on the Trinity River. Frequent damaging floods restrict other areas to pasture and hardwood timber production. The potential is high for pasture and timber production. It is medium for cultivated crops in areas protected from flooding. The potential is low for urbanization because of flooding and the shrink-swell properties. It is low for recreation because of frequent flooding, the clayey texture, and the wetness. The potential is medium for openland wildlife and good for woodland wildlife.

5. Gomery-Rosenwall-Moten

Moderately deep and deep, sandy and loamy, nearly level to rolling soils on uplands and terraces

This map unit makes up about 5 percent of the county. This unit is about 30 percent Gomery soils, 12 percent Rosenwall soils, 11 percent Moten soils, and 47 percent soils of minor extent. Slopes are 0 to 16 percent.

Gomery soils are on upland hills. The upper 26 inches is very friable, grayish brown, pale brown, and mottled yellowish brown loamy fine sand. From 26 to 54 inches is friable, mottled grayish brown, red, yellowish brown, and gray sandy clay loam. The underlying material is strongly cemented, gray sandstone. The soil ranges from slightly acid in the upper 26 inches to strongly acid below.

Rosenwall soils are in the higher convex areas. The surface layer is friable, brown fine sandy loam about 6

inches thick. Between 6 and 27 inches is firm, dark red and mottled dark red, reddish brown, and dark reddish gray clay that is stratified with gray shaly clay in the lower part. Below this to a depth of 30 inches is strongly cemented sandstone stratified with gray shale. The soil is slightly acid in the surface layer and very strongly acid below.

Moten soils are on old stream terraces and gently sloping depressional uplands. The surface layer is friable, dark grayish brown fine sandy loam about 4 inches thick. Between 4 and 46 inches is friable, grayish brown fine sandy loam and dark grayish brown sandy clay loam. Below this to a depth of 75 inches is firm, brown clay. The soil ranges from medium acid in the upper part to mildly alkaline in the lower part.

This unit is used mainly for timber. The potential is medium for pine timber. The soils are droughty. The potential is low for cropland because of the rooting depth. It is high for pasture. The potential is low for urban use because of wetness. It is low for recreational use because of the sandy surface and the slow movement of water through the soil. The potential is medium for openland and woodland wildlife.

6. Kaman-Landman-Elysian Variant

Deep, sandy to clayey, nearly level and gently undulating soils on bottom lands and terraces

This map unit makes up about 2 percent of the county. It is about 35 percent Kaman soils, 20 percent Landman soils, 8 percent Elysian variant soils, and 37 percent soils of minor extent. Slopes are 0 to 5 percent.

Kaman soils are in the nearly level areas. The surface layer is very firm, black clay about 33 inches thick. Below this to a depth of 65 inches is very firm, dark gray clay. The soil is medium acid in the upper part and slightly acid in the lower part.

Landman soils are on broad convex ridges. The surface layer is very friable, very dark grayish brown loamy fine sand about 7 inches thick. Between 7 and 74 inches is loose and friable, light yellowish brown loamy fine sand that has thin dark brown bands in the lower part. Below this to a depth of 80 inches is firm, mottled grayish brown, yellowish brown, and red sandy clay loam. The soil is slightly acid to a depth of 74 inches and strongly acid below.

The Elysian variant soils are on low convex ridges. The upper 29 inches is friable, brown and light yellowish brown fine sandy loam. From 29 to 66 inches is friable, mottled and streaked, yellowish brown sandy clay loam and firm, streaked and mottled red, yellowish brown, and grayish brown clay. Below this to a depth of 80 inches is very friable, light brownish gray loamy sand with thin bands of mottled clayey material. The soil ranges from slightly acid in the upper part to strongly acid in the lower part.

Also in this unit are Kaufman and Trinity soils. Kaufman and Trinity are associated clayey soils on bottom land.

This unit is used for cultivated crops, pasture, and timber. The potential is high for all three. It is low for urban use because of the wetness, the shrink-swell, and the flooding. The potential is low for recreation because of the wetness and the flooding. It is medium for openland and woodland wildlife.

7. Woodtell-Falba

Moderately deep and deep, loamy, nearly level to sloping soils on uplands

This map unit makes up about 2 percent of the county. It is about 27 percent Woodtell soils, 25 percent Falba soils, and 48 percent soils of minor extent. Slopes are 0 to 8 percent.

Woodtell soils are on convex slopes. The surface layer is friable, light yellowish brown fine sandy loam about 7 inches thick. From 7 to 58 inches is firm and very firm red and mottled brown clay. Below this to 80 inches is friable, light brownish gray clay loam mottled with brownish yellow and brown. The soil is strongly acid in the surface layer and very strongly acid below.

Falba soils are on convex slopes. The upper 7 inches is very friable, brown and grayish brown fine sandy loam. Between 7 and 33 inches is very firm, grayish brown clay and brownish gray sandy clay loam. Below this to a depth of 55 inches is very pale brown, tuffaceous fine sandstone. The soil is strongly acid in the surface layer and very strongly acid below.

Also in this unit are Depcor, Elmina, Galilee, and Lufkin soils. The sandy Depcor and Elmina soils are in the highest positions on the landscape. Galilee soils are on steep breaks. Lufkin soils are in the lowest position on the landscape.

This unit is used for pasture and timber production. The potential is medium for pasture and cropland because of wetness. It is low for timber production because the soil has a claypan and is droughty. The potential is low for urban use because water moves through the soil slowly and the soil shrinks and swells with changes in moisture content. It is low for recreation because of the slope and the slow movement of water through the soil. The potential is medium for openland and woodland wildlife.

8. Conroe

Deep, sandy, gently undulating soils on uplands

This map unit makes up about 1 percent of the county. It is 60 percent Conroe soils and 40 percent soils of minor extent. Slopes are 1 to 5 percent.

Conroe soils are on convex slopes. The upper 28 inches is very friable, grayish brown and light yellowish brown loamy fine sand. From 28 to 33 inches is firm,

yellowish brown sandy clay loam mottled with red. Below this to 70 inches is firm, coarsely mottled dark red, light gray, and strong brown clay. The soil ranges from slightly acid in the upper part to strongly acid in the lower part.

Also in this unit are Depcor, Gunter, and Kanebreak soils. The sandy Depcor soil is at an intermediate level on the landscape. The thick sandy Gunter soil is in the highest position on the landscape. The loamy Kanebreak soil is on the narrow stream bottoms.

This unit is used mainly for timber production and woodland grazing. The potential is medium for pine timber. The high amount of iron in the form of plinthite restricts roots, and the soils are droughty. The potential is medium for cropland because of the rooting depth. It is low for pasture. Rooting depth is the restrictive feature. The potential for urban use is medium. Water moves slowly through the soil, and the soil corrodes uncoated steel. The potential is medium for recreation because of the sandy surface texture. It is medium for openland wildlife and high for woodland wildlife.

Broad land use considerations

Land use in the county is dominantly pastureland and woodland. According to the Conservation Needs Inventory in 1967, about 103,428 acres is pastureland and 361,661 acres woodland. In general, the soils are well suited to pasture, particularly those in map units 1, 4, 5, and 6. Commercial fertilizer and good management are needed to obtain highest yields. Timber production of pine is high in unit 1. Hardwood production is high in units 4 and 6. Good timber management and silvicultural practices are needed to sustain maximum stocked growing stands.

Recreation in the county is of major importance. Map unit 8 has medium potential; the others have low potential. Soil texture, wetness, and permeability are the major limiting factors. The demand for recreation areas is expected to increase rapidly with the predicted increasing population in the surrounding areas. Selecting the soils best suited to recreation and installing and maintaining the facilities will be a major consideration.

The need for urban areas is also increasing at a rapid rate. Most map units have low potential for urban use because the clayey subsoil shrinks and swells with changes in moisture content. Also, most soils are not suitable as septic tank absorption fields because the absorption rate of effluent is slow to very slow. This limitation can be overcome by proper design and installation.

Only a small acreage is used as cropland. The Conservation Needs Inventory of 1967 shows only 11,523 acres in crops. Most map units have low to medium potential for crop production. In general, the soils are low in natural fertility, low in organic matter, and medium in available water capacity.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have a profile that is almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Arol fine sandy loam, 1 to 3 percent slopes, is one of two phases within the Arol series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes, soil associations, and undifferentiated groups.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. The Depcor-Urban land complex, 1 to 8 percent slopes, is an example.

A *soil association* is made up of soils that are geographically associated and are shown as one unit on the map because it is not practical to separate them. A soil association has considerable regularity in geographic pattern and in the kinds of soil that are a part of it. The extent of the soils can differ appreciably from one delin-

eation to another; nevertheless, interpretations can be made for use and management of the soils. The Galilee-Gomery association, undulating, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map has at least one of the dominant (named) soils or may have all of them. Falba and Arol soils, 1 to 5 percent slopes, eroded, is an undifferentiated group in this survey area.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Pits is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

Not all units in this survey area have been mapped with the same degree of detail. Broadly defined units, identified by a foot note on the soil legend at the back of this publication, are likely to be larger and to vary more in composition than units mapped in greater detail. Composition has been controlled well enough, however, for the expected use of the soils.

The acreage and proportionate extent of each map unit are given in table 5, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

1—Annona-Urban land complex, 1 to 8 percent slopes. This gently sloping to sloping map unit is on convex uplands. Areas are irregularly shaped and range from 20 to 500 acres.

The unit is 20 to 80 percent Annona soil, 20 to 70 percent Urban land, and 10 percent or less other soils. The Annona soils and Urban land are so intricately mixed that mapping them separately is not practical at the scale selected for mapping.

The Annona soils have a surface layer of friable, slightly acid, brown fine sandy loam about 8 inches thick. From 8 to 18 inches is very firm, slightly acid, mottled red, brownish yellow, and gray clay. From 18 to 70 inches is very firm, moderately alkaline, mottled red, gray, and brownish yellow clay.

The Annona soils are somewhat poorly drained. Surface runoff is slow, and permeability is very slow. Available water capacity is high.

Urban land consists of works, structures, and areas where the soil has been altered or so obscured by cutting, filling, or grading that classification is not possible.

Included in mapping are areas of Depcor, Gunter, Huntsburg, Houston Black, and Kanebreak soils.

This unit has medium potential for trees.

Streets, roads, and driveways are difficult to keep smooth because the soil shrinks and swells with changes in moisture.

2—Annona association, gently undulating. These deep soils are on convex uplands in broad areas on interstream divides. Slopes are 1 to 5 percent. Areas are irregular to oval and range from 10 to 500 acres.

This map unit is about 80 percent Annona soils and 20 percent other soils.

Typically the Annona soils have a surface layer of friable, slightly acid, brown fine sandy loam about 4 inches thick. From 4 to 10 inches is very firm, strongly acid, red clay mottled with strong brown. Between 10 and 24 inches is very firm, medium acid, mottled red, yellowish brown, and gray clay. From 24 to 38 inches is very firm, medium acid, gray clay mottled with red and yellowish brown. From 38 to 44 inches is very firm, slightly acid, yellowish brown clay mottled with light brownish gray and yellowish brown. From 44 to 80 inches is very firm, moderately alkaline, mottled grayish brown and yellowish brown clay.

Annona soils are somewhat poorly drained and have a high available water capacity. Permeability is very slow, and runoff is slow. Tilth is only fair, and the soil can be worked within only a moderate range of moisture content. The root zone is deep but is very difficult to penetrate.

Included in mapping are areas of Huntsburg soils at a slightly higher elevation than Annona soils. Included soils make up about 20 percent of any one mapped area.

This unit is used mainly for pine timber. It has medium potential for timber and is well suited to loblolly pine, shortleaf pine, and slash pine. Some areas are used for pasture, for which the potential is medium. Common bermudagrass, Coastal bermudagrass, and bahiagrass are well suited. Only a small acreage is cultivated.

This unit has low potential for urban and recreational uses. The soils shrink and swell, they corrode uncoated steel, and they are wet. Wetness and the very slow permeability restrict recreational use.

Capability subclass IVe; woodland group 3c2; Tight Sandy Loam grazing group.

3—Annona association, gently rolling. These deep soils are on the lower parts of the slopes on uplands. Slopes are 5 to 10 percent and are slightly convex. Areas are long and range from 20 to 125 acres.

The unit is about 85 percent Annona soils and 15 percent other soils.

Typically the Annona soils have a surface layer of friable, slightly acid, grayish brown fine sandy loam about 7 inches thick. From 7 to 12 inches is very firm, strongly acid, red clay. From 12 to 17 inches is firm, very strongly acid, mottled red, strong brown, and light gray clay. From 17 to 39 inches is very firm, very strongly acid, light gray clay mottled with red. The underlying material to 65 inches is very firm, light gray clay that is strongly acid.

The soils are somewhat poorly drained and have a high available water capacity. Permeability is very slow, and runoff is slow. Tilth is only fair and the soil can be worked within only a moderate range of moisture content. The root zone is deep but is very difficult to penetrate.

Included in mapping are small areas of Ferris clay. Included soils make up about 15 percent of any one mapped area.

This unit is used mainly for timber. It has medium potential for pine timber. Loblolly pine and shortleaf pine are well suited. Small acreages are in pasture, for which the potential is medium. Common bermudagrass and Coastal bermudagrass are well suited.

Potential is low for urban and recreational uses. The soils shrink and swell, they are wet, and they corrode uncoated steel. Wetness and the very slow permeability restrict recreational use.

Capability subclass VIe, woodland group 3c2; Tight Sandy Loam grazing group.

4—Arol fine sandy loam, 0 to 1 percent slopes. This moderately deep soil is in concave areas along streams. Areas are oval to long and range from 10 to 150 acres.

The surface layer is friable, medium acid, dark grayish brown fine sandy loam about 8 inches thick. Between 8 and 38 inches is firm, black clay that is slightly acid. The underlying material is neutral, pale olive clayey tuff.

The soil is somewhat poorly drained and is saturated in winter and spring. Permeability is very slow, and runoff is slow. The available water capacity is low. Tilth is poor and the soil can be worked within only a moderate range of moisture content. The root zone is moderately deep but is difficult to penetrate.

Included in mapping are areas of small scattered sandy mounds and areas along drains where the substratum is below 40 inches. Included soils make up less than 15 percent of any one mapped area.

This soil is used mainly for pasture. The potential for pasture production is low. Common bermudagrass and Coastal bermudagrass are well suited. The potential for crops is medium. High residue crops are needed to improve tilth, available water capacity, and internal drainage.

The soil has low potential for urban and recreational uses. The clay subsoil shrinks and swells, it is wet in winter and spring, and it corrodes uncoated steel. Wetness and the very slow permeability restrict recreational use.

Capability subclass IIIw; Claypan Savannah range site.

5—Arol fine sandy loam, 1 to 3 percent slopes. This moderately deep soil is on slightly convex uplands. Areas are oval to long and range from 10 to 80 acres.

The surface layer is friable, medium acid, dark grayish brown fine sandy loam about 6 inches thick. From 6 to 30 inches is firm, medium acid, black clay over very firm, slightly acid, very dark gray clay. The underlying material is neutral, pale olive clayey tuff.

The soil is somewhat poorly drained and is saturated in winter and spring in most years. Permeability is very slow, and runoff is slow. The available water capacity is low. Tilth is poor, and the soil can be worked within only a moderate range of moisture content. The root zone is moderately deep but is difficult to penetrate.

Included in mapping are small areas of Falba soils. Also included are small areas of Leson clay which occur at the top of the low ridges. Included soils make up less than 15 percent of any one mapped area.

This soil is used mainly for pasture. The potential for pasture production is low. Common bermudagrass and Coastal bermudagrass are well suited. The potential for crops is medium. High residue crops are needed to improve tilth, available water capacity, and internal drainage.

The soil has low potential for urban and recreational uses. The clay subsoil shrinks and swells, it is wet in winter and spring, and it corrodes uncoated steel. The wetness and the very slow permeability restrict recreational use.

Capability subclass IIIe; Claypan Savannah range site.

6—Arriola fine sandy loam, 1 to 5 percent slopes. This moderately deep soil is on uplands. Areas are long to oval and range from 10 to 150 acres.

The surface layer is friable, slightly acid, pale brown fine sandy loam about 4 inches thick. From 4 to 9 inches is friable, slightly acid, light yellowish brown fine sandy loam. From 9 to 16 inches is very firm, very strongly acid, dark red clay mottled with brown. From 16 to 23 inches is very firm, very strongly acid, mottled red and dark reddish gray clay. From 23 to 38 inches is very firm, very strongly acid brown clay mottled with dark red. The underlying material to a depth of 50 inches is light brownish gray siltstone.

Permeability is very slow, and runoff is medium. The available water capacity is low. Tilth is only fair, and the soil can be worked within only a moderate range of moisture content. The root zone is moderately deep and is difficult to penetrate.

Included in mapping are small areas of Falba and Arol soils, which occur in the more gently sloping part of the

area. Included soils make up less than 20 percent of any one mapped area.

This soil is used mainly for timber and pasture. The potential for pine timber is medium. Shortleaf pine is well suited. The potential for pasture is low. Common bermudagrass and Coastal bermudagrass are best suited. The potential for the small amount of cropland is medium. High residue crops are needed to improve tilth, available water capacity, and internal drainage.

The soil has low potential for urban and most recreational uses. The clay subsoil shrinks and swells and has low strength. It restricts water movement, which limits recreational use in camp areas and on playgrounds.

Capability subclass IVe; woodland group 4c2; Tight Sandy Loam grazing group.

7—Conroe association, gently undulating. These deep soils are on uplands. Slopes are 1 to 5 percent. Areas are irregularly shaped and range from 20 to 300 acres.

This unit is about 85 percent Conroe soils and 15 percent other soils.

The surface layer is very friable, slightly acid, grayish brown loamy fine sand about 5 inches thick. Between 5 and 28 inches is very friable, medium acid, light yellowish brown loamy fine sand. From 28 to 33 inches is firm, strongly acid, yellowish brown sandy clay loam mottled with red. From 33 to 70 inches is firm, coarsely mottled dark red, light gray, and strong brown clay that is strongly acid.

These soils are moderately well drained and have medium available water capacity. Permeability and runoff are slow. Tilth is only fair, but the soil can be worked throughout a wide range of moisture content. The root zone is deep but is difficult to penetrate.

Included in mapping are small areas having a high percentage of iron ore gravel, areas where the surface has been removed and used as road base material, and small areas of Gunter soils at higher elevations. Included soils make up about 15 percent of any one mapped area.

This unit is used mainly for timber. It has medium potential for pine timber. Loblolly pine and shortleaf pine are best suited. Small acreages are in pasture. The potential is high for pasture. Common bermudagrass and Coastal bermudagrass are well suited.

The potential is medium for urban and recreational uses. The soils have a perched water table in winter and corrode uncoated steel. The sandy surface texture restricts recreational use.

Capability subclass IIIs; woodland group 3s2; Sandy grazing group.

8—Depcor-Urban land complex, 1 to 8 percent slopes. This map unit is on slightly convex uplands. Areas are irregularly shaped and range from 20 to 500 acres.

This unit is 20 to 80 percent Depcor soils, 20 to 70 percent Urban land, and 15 percent or less included soils. The Depcor soils and Urban land are so intricately mixed that mapping them separately is not practical.

The Depcor soil has a surface layer of very friable, very strongly acid, brown loamy fine sand about 5 inches thick. Between 5 and 28 inches is very friable, very strongly acid, light yellowish brown loamy fine sand. From 28 to 80 inches is firm, very strongly acid, red sandy clay loam.

This Depcor soil is moderately well drained. Surface runoff and permeability are slow. Available water capacity is medium.

Urban land consists of works, structures, and areas where the soil has been altered or so obscured by cutting, filling, or grading that classification is not possible.

Included in mapping are areas of Annona, Gunter, Huntsburg, and Kanebreak soils.

This unit has high potential for trees. The potential for urban use is medium. The loose sand, when dry, is unstable for vehicular traffic. Streets and roads should be oiled, paved, or gravelled.

9—Depcor-Huntsburg association, gently undulating. This map unit is on upland interstream divides. Slopes are 1 to 5 percent. Areas are irregularly shaped and range from 15 to more than 1,000 acres.

This unit is about 54 percent Depcor soils, 31 percent Huntsburg soils, and 15 percent other soils.

Some areas of Depcor and Huntsburg soils are large enough to be mapped separately. The soils, however, are so similar in use and management that mapping them separately is not justified.

The Depcor soil has a convex surface and is in the more sloping areas of the unit. The surface layer is very friable, very strongly acid, brown loamy fine sand about 5 inches thick. Between 5 and 26 inches is very friable, very strongly acid, light yellowish brown loamy fine sand. From 26 to 32 inches is firm, very strongly acid, yellowish brown sandy clay loam mottled with red (fig. 4). From 32 to 44 inches is firm, very strongly acid, yellowish brown, dark red, and light brownish gray sandy clay loam. Between 44 and 65 inches is firm, very strongly acid, mottled red, strong brown, and light brownish gray sandy clay loam. The underlying material from 65 to 80 inches is firm, very strongly acid, red sandy clay loam mottled with yellowish brown.

The Depcor soil is moderately well drained. Permeability and runoff are slow. Available water capacity is medium. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep and can be penetrated easily.

The Huntsburg soil has a plane to slightly concave surface. It is in the less sloping areas of the unit. The surface layer is very friable, slightly acid, brown loamy fine sand about 6 inches thick. Between 6 and 14 inches is very friable, medium acid, light yellowish brown loamy

fine sand. From 14 to 22 inches is firm, strongly acid, yellowish brown sandy clay. From 22 to 32 inches is very firm, strongly acid, mottled gray, dark red, and reddish yellow clay. From 32 to 48 inches is very firm, very strongly acid, light brownish gray clay mottled with red and reddish yellow. Between 48 and 61 inches is very firm, very strongly acid, light gray clay mottled with dark red and reddish yellow. The underlying material from 61 to 72 inches is very firm, very strongly acid, light gray clay mottled with dark red and brownish yellow.

The Huntsburg soil is moderately well drained. Permeability is very slow, and runoff is slow. Available water capacity is medium. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep but is somewhat difficult to penetrate.

Included in mapping are areas of Annona, Conroe, Gunter, Kanebreak, and Nugent soils. Included soils make up about 6 percent of the map unit.

This unit is used mainly as woodland. It has high potential for woodland and medium potential for cropland and pastureland.

The unit has low potential for urban and recreational development. The water table is perched. The Huntsburg soil has a clayey subsoil that shrinks and swells and has low strength. The sandy surface layer restricts recreational use.

Woodland group 3s2; Sandy grazing group; capability subclass IIIe Depcor soils, IVe Huntsburg soils.

10—Depcor-Huntsburg-Gunter association, gently rolling. This map unit is on ridges and side slopes of upland interstream divides. Slopes are 5 to 10 percent. Areas are oblong and range from 25 to 500 acres.

This unit is about 40 percent Depcor soils, 23 percent Huntsburg soils, 22 percent Gunter soils, and 15 percent other soils.

Some areas of Depcor, Huntsburg, and Gunter soils are large enough to be mapped separately. The soils, however, are so similar in use and management that mapping them separately is not justified.

The Depcor soil is on convex side slopes between the ridgetops and the more sloping areas adjacent to streams. The surface layer is very friable, very strongly acid, brown loamy fine sand about 5 inches thick. Between 5 and 30 inches is very friable, very strongly acid, light yellowish brown loamy fine sand. From 30 to 35 inches is firm, very strongly acid, yellowish brown sandy clay loam mottled with red. From 35 to 46 inches is firm, very strongly acid sandy clay loam mottled with yellowish brown and dark red.

Between 46 and 66 inches is firm, and very strongly acid, mottled red, strong brown, and light brownish gray sandy clay loam. The underlying material from 66 to 80 inches is firm, very strongly acid, red sandy clay loam mottled with yellowish brown.

The Depcor soil is moderately well drained. Permeability and runoff are slow. Available water capacity is medium. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep and can be easily penetrated.

The Huntsburg soil is on plane to slightly concave side slopes and in the less sloping areas adjacent to streams. It has a surface layer of very friable, slightly acid, brown loamy fine sand about 6 inches thick. Between 6 and 14 inches is very friable, medium acid, light yellowish brown loamy fine sand. From 14 to 22 inches is firm, strongly acid, yellowish brown sandy clay. From 22 to 32 inches is very firm, strongly acid, mottled gray, dark red, and reddish yellow clay. From 32 to 48 inches is very firm, very strongly acid, light brownish gray clay mottled with red and reddish yellow. Between 48 to 61 inches is very firm, very strongly acid, light gray clay mottled with dark red and reddish yellow. The underlying material from 61 to 72 inches is very firm, very strongly acid, light gray clay mottled with dark red and brownish yellow.

The Huntsburg soil is moderately well drained. Permeability is very slow, and runoff is slow. Available water capacity is medium. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep but is somewhat difficult to penetrate.

The Gunter soil is on ridgetops and knolls. It has a surface layer of very friable, strongly acid, dark grayish brown loamy sand about 4 inches thick. Between the 4 and 48 inches is very friable, slightly acid, loamy sand. This layer is pale brown in the upper part and very pale brown mottled with strong brown in the lower part. From 48 to 60 inches is friable, very strongly acid, mottled yellowish brown, light gray, red, and yellowish red sandy loam. From 60 to 75 inches is firm, very strongly acid, mottled dark red and white sandy clay loam that is 10 to 50 percent plinthite by volume.

The Gunter soil is moderately well drained. Runoff is slow. Permeability is rapid above the layer containing plinthite and moderately slow below. Available water capacity is low. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep and can be easily penetrated.

Included in mapping are areas of Annona, Conroe, Nugent, and Kanebreak soils. Included soils make up about 13 percent of any one mapped area.

This unit is used mainly for timber production. The potential is high for timberland and medium for pastureland.

The unit has low potential for urban and recreational development. The water table is perched in winter and early in spring. In some areas the Huntsburg soil has a clayey subsoil that shrinks and swells and has low strength. The sandy surface layer restricts many urban and recreational uses.

Sandy grazing group; capability subclass VIe Depcor and Huntsburg soils, IVs Gunter soils; woodland group 2s2 Depcor and Huntsburg soils, 3s2 Gunter soils.

11—Elmina association, gently undulating. These deep soils are on upland interstream divides. Slopes are convex and range from 1 to 5 percent. Areas are irregularly shaped and range from 20 to 300 acres.

This map unit is about 80 percent Elmina soils and 20 percent other soils.

The surface layer is very friable, strongly acid, light brownish gray loamy fine sand about 4 inches thick. Between 4 and 32 inches is very friable, strongly acid, very pale brown loamy fine sand with scattered yellowish brown mottles in the lower part. From 32 to 40 inches is very firm, very strongly acid, grayish brown clay mottled with red and yellowish brown. From 40 to 52 inches is very firm, very strongly acid, light brownish gray clay mottled with dark red and yellowish brown. The underlying material to 60 inches is strongly cemented sandstone.

The unit is somewhat poorly drained and has a low available water capacity. Permeability and runoff are very slow. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep and is easy to penetrate.

Included in mapping are areas of Falba soils and areas of small sandy mounds. Included soils make up about 20 percent of any one mapped area.

This unit is used mainly for pasture and timber. It has medium potential for pasture. Common bermudagrass and Coastal bermudagrass are well suited. Potential is medium for pine timber. Loblolly pine (fig. 5) and shortleaf pine are well suited. A small acreage is cultivated.

Potential is medium for urban and recreational uses. The soils corrode uncoated steel and are wet in winter. The sandy surface texture restricts recreational use.

Capability subclass IIIe; woodland group 3s2, Sandy grazing group.

12—Falba fine sandy loam, 0 to 1 percent slopes. This moderately deep soil is on plane to slightly concave uplands. Areas are irregularly shaped and range from 14 to 120 acres.

The surface layer is very friable, strongly acid, dark grayish brown fine sandy loam about 6 inches thick. From 6 to 9 inches is very friable, very strongly acid, light gray fine sandy loam. Between 9 and 20 inches is very firm, very strongly acid, dark gray clay. From 20 to 37 inches is very firm, very strongly acid, grayish brown clay. The underlying material to 57 inches is light gray clayey tuff.

This soil is somewhat poorly drained and is saturated in winter and spring in most years. Permeability is very slow, and runoff is slow. The available water capacity is low. Tilth is fair, and the soil can be worked within only a moderate range of moisture content. The root zone is moderately deep but is difficult to penetrate.

Included in mapping are small areas of Arol soils. Included soils make up less than 20 percent of any one mapped area.

This soil is used mainly for pasture. Part of the acreage is in timber. A smaller acreage is in row crops. The potential for pasture is low. Common bermudagrass and Coastal bermudagrass are well suited. The potential for crops is low. High residue crops are needed to improve tilth, water holding capacity, and internal drainage. The potential for timber is low.

The soil has low potential for urban and recreational uses. The clay subsoil shrinks and swells, and it corrodes uncoated steel. It also restricts water movement.

Capability subclass IIIw; Claypan Savannah range site.

13—Falba fine sandy loam, 1 to 5 percent slopes. This moderately deep soil is on convex uplands. Areas are long to irregularly shaped and range from 14 to 800 acres.

The surface layer is very friable, strongly acid, brown fine sandy loam about 5 inches thick. From 5 to 7 inches is very friable, very strongly acid, grayish brown fine sandy loam. Between 7 and 24 inches is very firm, very strongly acid, grayish brown clay. From 24 to 33 inches is very firm, very strongly acid, light brownish gray sandy clay loam (fig. 6). The underlying material to 55 inches is very pale brown tuffaceous fine sandstone.

This soil is somewhat poorly drained and is saturated in winter and spring in most years. Permeability is very slow, and runoff is medium. The available water capacity is low. Tilth is only fair, and the soil can be worked within only a moderate range of moisture content. The root zone is moderately deep but is difficult to penetrate.

Included in mapping are small areas of Arol soils. Rock crops out where the slope break is abrupt. Small scattered mounds of loamy fine sand occur in some areas.

This soil is used mainly for pasture. Some acreage is in timber and a small amount in row crops. The potential for pasture is low. Common bermudagrass and Coastal bermudagrass are well suited. The potential for crops is low. High residue crops are needed to improve tilth, available water capacity, and internal drainage. The potential for timber is low.

The soil has low potential for urban and recreational uses. The clay subsoil shrinks and swells, it is wet at times, and it corrodes uncoated steel. Wetness and the very slow permeability restrict recreational use.

Capability subclass IVe; Claypan Savannah range site.

14—Falba complex, 5 to 8 percent slopes. This map unit is on side slopes on uplands. Areas are long and range from 10 to 100 acres.

This unit is about 70 percent Falba soils and similar soils and 30 percent other soils. The soils similar to

Falba soils are 12 to 17 inches deep over sandstone or have a sandy clay loam subsoil. The Falba soils and the similar soils are so intricately mixed that mapping them separately is not possible at the scale selected for mapping.

Typically the Falba soil has a surface layer of friable, very strongly acid, grayish brown fine sandy loam about 8 inches thick. From 8 to 30 inches is very firm, strongly acid, grayish brown clay. The underlying material is pale brown, tuffaceous clay that is strongly acid.

Falba soil is somewhat poorly drained. Surface runoff is medium, and permeability is very slow. Available water capacity is low.

Included in mapping are small areas of Arol soils and areas of Rock outcrop near the slope breaks. Included soils make up about 30 percent of the map unit.

This unit is used mainly for pasture and timber. It has low potential for timber and for pasture. Common bermudagrass and Coastal bermudagrass are well suited. Shortleaf pine is well suited.

The unit has low potential for urban and recreational uses. The clay subsoil shrinks and swells, it is wet at times, and it corrodes uncoated steel. Wetness and slope restrict recreational use.

Capability subclass VIe; Claypan Savannah range site.

15—Falba and Arol soils, 1 to 5 percent slopes, eroded. This map unit is on sloping uplands. Areas are irregularly shaped and range from 10 to 75 acres.

This unit is about 50 percent Falba soils and 40 percent Arol soils. Of these soils about 50 percent of the acreage is eroded. Other soils comprise about 10 percent of the unit. These soils do not occur in a regular pattern.

Typically the Falba soil has a convex surface. The surface layer is friable, very slightly acid, grayish brown fine sandy loam about 4 inches thick. Between 4 and 24 inches is very firm, medium acid, dark grayish brown clay. From 24 to 34 inches is very firm, slightly acid, grayish brown clay. The underlying material below 34 inches is grayish brown, tuffaceous clay that is slightly acid.

The Falba soil is somewhat poorly drained. Permeability is very slow, and runoff is medium. Available water capacity is low.

The Arol soil has a plane to slightly concave surface. The surface layer is friable, medium acid, dark grayish brown fine sandy loam about 3 inches thick. From 3 to 27 inches is very firm, slightly acid, black clay. The underlying material is light brownish gray, tuffaceous clay that is neutral.

The Arol soil is somewhat poorly drained. Permeability is very slow, and runoff is slow. Available water capacity is low.

Included in mapping are small areas of Elmina and Lufkin soils. Included soils make up about 10 percent of the map unit.

This unit is used mainly for pasture. Potential for pasture is low because of the low available water capacity and the thin eroded surface layers. Gullied areas that have been shaped and smoothed are well suited to common bermudagrass, Coastal bermudagrass, and bahiagrass.

This unit has low potential for urban and recreational uses. The soils shrink and swell, they are wet, and they corrode uncoated steel. Wetness, erosion, and permeability restrict recreational use.

Capability subclass IVe; Claypan Savannah range site.

16—Ferris clay, 1 to 5 percent slopes. This deep soil is on upland side slopes on the open prairie and in small scattered areas in the timbered region. Areas are long to irregular and range from 8 to 75 acres.

The surface layer is firm, moderately alkaline, dark gray clay about 6 inches thick. From 6 to 47 inches is firm, moderately alkaline, light gray clay mottled with brownish yellow or reddish yellow. The underlying material to a depth of 70 inches is firm, moderately alkaline, light gray clay mottled with brownish yellow.

Runoff is rapid. Permeability is rapid when the soil is dry and cracked but is very slow when the soil is wet. The available water capacity is high. Tilth is fair, and the soil can be worked within only a limited range of moisture content. The root zone is deep but is somewhat difficult to penetrate.

Included in mapping are areas that have two or three shallow, crossable gullies per acre. Also included are small areas of Houston Black soils on benches at mid slope and on foot slopes. Included soils make up less than 25 percent of any one mapped area.

This soil is mainly pasture. At one time it was mostly in row crops. The potential for pasture is medium. Suitable grasses are common bermudagrass, Coastal bermudagrass, and bahiagrass. The potential for cropland is low because of slope.

The soil has low potential for urban and recreational uses. The clay subsoil has a very high shrink-swell potential and low strength, and it corrodes uncoated steel. The slow movement of water and the clay texture restrict recreational use.

Capability subclass IIIe; Eroded Blackland range site.

17—Ferris clay, gullied. This deep soil is on upland side slopes. Slopes are plane and range from 3 to 10 percent. Areas are irregular to oval and range from 8 to 50 acres.

The surface layer is firm, moderately alkaline, dark gray clay about 6 inches thick. From 6 to 31 inches is firm, moderately alkaline, light gray clay (fig. 7). The underlying material to a depth of 70 inches is firm, moderately alkaline, light olive gray clay.

This unit is about 42 percent gullied areas. The gullies are several feet to more than 50 feet wide and 1 foot to more than 6 feet deep.

Runoff is rapid. Permeability is rapid when the soil is dry and cracked but is very slow when the soil is wet. The available water capacity is high. Tilth is only poor, and the soil can be worked within only a limited range of moisture content. The root zone is deep but is somewhat difficult to penetrate.

Included in mapping are small areas of Houston Black soils. Included soils make up about 15 percent of any one mapped area.

This soil is used mainly for pasture. The potential for pasture is low. Low fertility, severe sheet and gully erosion, and slope make pasture management difficult. Areas that have been shaped and smoothed are planted to common bermudagrass, Coastal bermudagrass, and bahiagrass.

The soil has low potential for urban and recreational uses. The clay subsoil shrinks and swells with changes in moisture content. It has low strength, and it corrodes uncoated steel. The clay texture, slow water movement, and many deep gullies restrict recreational use.

Capability subclass VIe; Eroded Blackland range site.

18—Galilee-Gomery association, rolling. This map unit is on upland side slopes. Slopes are 5 to 16 percent. Areas are long to irregular and they range from 30 to 300 acres.

This unit is about 47 percent Galilee soils, 22 percent Gomery soils, and 31 percent other soils. Some areas of Galilee and Gomery soils are large enough to be mapped separately, but the soils are so similar in use and management that mapping them separately is not justified.

The Galilee soil is in slightly convex areas near the top of slopes. The surface layer is friable, slightly acid, grayish brown fine sandy loam about 8 inches thick. From 8 to 19 inches is firm, very strongly acid, yellowish red clay. From 19 to 26 inches is firm, very strongly acid, reddish brown clay. From 26 to 32 inches is firm, very strongly acid, reddish brown sandy clay loam. Between 32 and 38 inches is firm, very strongly acid, sandy clay loam mottled with yellowish red and brown. The underlying material to a depth of 50 inches is stratified, weakly cemented sandstone interbedded with mottled reddish brown and brown fine sandy loam that is very strongly acid.

The Galilee soil is moderately well drained. Permeability is slow, and runoff is very rapid. Available water capacity is low.

The Gomery soil is on slightly concave foot slopes. The surface layer is very friable, slightly acid, dark grayish brown loamy fine sand about 5 inches thick. Between 5 and 18 inches is very friable, slightly acid, pale brown loamy fine sand. From 18 to 26 inches is very friable, slightly acid, light yellowish brown loamy fine sand. From 26 to 31 inches is friable, strongly acid, mottled grayish brown, red, and yellowish brown sandy clay loam. From 31 to 47 inches is friable, medium acid, grayish brown sandy clay loam mottled with red. From 47 to 54 inches is friable, medium acid, gray sandy clay loam mottled with red. The underlying material is strongly cemented, gray sandstone.

The Gomery soil is somewhat poorly drained. Permeability is moderately slow, and runoff is medium. Available water capacity is medium.

Included in mapping are small areas of Rosenwall and Goreen soils. Included soils make up about 31 percent of any one mapped area.

This unit is used mainly for timber. It has medium potential for pine timber. Loblolly pine and shortleaf pine are well suited. A small acreage is in pasture.

The unit has low potential for urban and recreational uses. Slope, low strength, and the sandy surface texture restrict urban and recreational use.

Capability subclass VIe; woodland group 4s2 Galilee soils, 3s2 Gomery soils; Tight Sandy Loam grazing group Galilee soils, Sandy group Gomery soils.

19—Gladewater clay, frequently flooded. This nearly level soil is on flood plains. It is inundated about twice a year for a period of 3 days to 2 weeks. Slopes are 0 to 1 percent. Areas are long and range from 50 to 600 acres.

The surface layer is very firm, slightly acid, grayish brown clay about 6 inches thick. Between 6 and 25 inches is firm, medium acid, grayish brown clay. From 25 to 35 inches is firm, mildly alkaline, gray clay. From 35 to 65 inches is very firm, mildly alkaline, dark gray clay.

This soil is poorly drained and has a high available water capacity. Permeability and surface runoff are very slow. Tilth is poor, and the soil can be worked within only a very limited range of moisture content. The root zone is moderately deep but is very difficult to penetrate.

Included in mapping are small areas of Kaman, Gowker, Kanebreak, and Trinity soils and small areas of Nugent soils adjacent to stream channels. Included soils make up less than 20 percent of any one mapped area.

This soil is used mainly for pasture and hardwood timber. It has high potential for pasture. Common bermudagrass, Coastal bermudagrass, common lespedeza, and burclover are well suited. It has high potential for hardwood timber. Hackberry, water oak, willow oak, green ash, and elm are well suited.

This soil has low potential for cultivated crops. Frequent flooding and wetness are severe limitations, which can be overcome only by major flood control and drainage measures.

The soil has low potential for urban and recreation uses. It has a high shrink-swell potential, it is frequently flooded, and it corrodes uncoated steel. Frequent flooding, wetness, and the clay texture limit recreational use.

Capability subclass Vw; woodland group 2w6; Clayey Bottomland grazing group.

20—Gomery association, undulating. These deep soils are on convex uplands. Slopes range from 1 to 8 percent. Areas are irregularly shaped and range from 50 to 400 acres.

This map unit is about 55 percent Gomery soils and 45 percent other soils.

The surface layer is very friable, slightly acid, dark grayish brown loamy fine sand about 5 inches thick. Between 5 and 18 inches is very friable, slightly acid, pale brown loamy fine sand. From 18 to 26 inches is very friable, slightly acid, light yellowish brown loamy fine sand mottled with strong brown. From 26 to 31 inches is friable, strongly acid, mottled grayish brown, red, and yellowish brown sandy clay loam. The layer from 31 to 47 inches is friable, medium acid, grayish brown sandy clay loam mottled with red. From 47 to 54 inches is friable, medium acid, gray sandy clay loam mottled with red. The underlying material is strongly cemented, gray sandstone.

The Gomery soil is somewhat poorly drained and has a medium available water capacity. Permeability is moderately slow, and runoff is medium. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated.

Included in mapping are areas of Rosenwall and Goreen soils. Also included are areas where the loamy fine sand is more than 40 inches thick. Included soils make up about 45 percent of any one mapped area.

This unit is used mainly as timberland. It has medium potential for pine timber. Loblolly pine (fig. 8) and shortleaf pine are well suited. Small areas are used as pasture, for which the potential is high.

The unit has only medium potential for urban and recreational uses. The water table is perched. The sandy surface layer restricts recreational use.

Capability subclass IVe; woodland group 3s2; Sandy grazing group.

21—Gowker and Kanebreak soils, frequently flooded. This nearly level map unit is on flood plains. It is inundated about twice a year for periods up to 7 days. Slopes are 0 to 1 percent. Areas are long and range from 10 to 300 acres.

This unit is about 45 percent Gowker soils, 40 percent Kanebreak soils, and 15 percent other soils. These soils are not uniform and do not occur in a regular pattern.

The Gowker soil is adjacent to foot slopes. The surface layer is firm, slightly acid, very dark gray clay loam about 9 inches thick. Between 9 and 30 inches is firm, slightly acid, black clay loam. From 30 to 34 inches is very firm, neutral, very dark gray clay. From 34 to 44 inches is very firm, slightly acid, dark gray clay mottled with brown. From 44 to 60 inches is firm, slightly acid, grayish brown sandy clay loam mottled with reddish brown.

The Gowker soil is moderately well drained and has a high available water capacity. Permeability and runoff are slow. Tilth is good, but the soil can be worked within only a limited range of moisture content. The root zone is deep and is easily penetrated.

The Kanebreak soil is in slightly convex areas adjacent to the stream channel. The surface layer is friable, medium acid, very dark grayish brown fine sandy loam about 8 inches thick. From 8 to 14 inches is friable, slightly acid, very dark grayish brown fine sandy loam mottled with brown. From 14 to 20 inches is firm, neutral, very dark grayish brown sandy clay loam mottled with reddish brown. Between 20 and 28 inches is firm, mildly alkaline, very dark grayish brown sandy clay loam mottled with brown. From 28 to 41 inches is friable, moderately alkaline, grayish brown fine sandy loam. The underlying material to 70 inches is friable, moderately alkaline, light brownish gray very fine sandy loam and thin strata of clay or clay loam.

The Kanebreak soil is somewhat poorly drained and has a medium available water capacity. Permeability and runoff are slow. Tilth is good, but the soil can be worked within only a limited range of moisture content. The root zone is deep and is easily penetrated.

Included in mapping are small areas of Kaman, Kaufman, and Trinity soils. Included soils make up about 15 percent of the map unit.

This unit is used mainly for pasture and timber. The potential for pasture is medium. Common bermudagrass, Coastal bermudagrass, bahiagrass, and dallisgrass are well suited. The potential for hardwood timber is high. Hackberry, water oak, willow oak, green ash, and elm are well suited.

The unit has low potential for urban and recreational uses. Frequent flooding and wetness are major limitations.

Capability subclass Vw; Loamy Bottomland grazing group; woodland group 1w5 Gowker soils, 2w8 Kanebreak soils.

22—Gunter association, undulating. These deep soils are on uplands. Slopes are 1 to 8 percent. Areas are irregularly shaped and range from 25 to 250 acres.

This map unit is about 67 percent Gunter soils and 33 percent other soils.

The surface layer is very friable, strongly acid, dark grayish brown loamy sand about 4 inches thick. Between 4 and 30 inches is very friable, slightly acid, pale brown loamy sand. From 30 to 48 inches is very friable, slightly acid, very pale brown loamy sand mottled with strong brown (fig. 9). From 48 to 60 inches is friable, very strongly acid, mottled yellowish brown, light gray, yellowish red, and red sandy loam. Below this is firm, very strongly acid, mottled dark red and white sandy clay loam that is 10 to 50 percent plinthite by volume.

The Gunter soil is moderately well drained and has a low available water capacity. Permeability is rapid above the layer containing plinthite and moderately slow below. There is no runoff. Tilth is good, and the soil can be

worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated.

Included in mapping are areas of Conroe soils. Included soils make up about 33 percent of the map unit.

This unit is used mainly as timberland. The potential for pine timber is medium. Loblolly pine and slash pine are best suited. A small acreage is in pasture, for which the potential is medium. Common bermudagrass and Coastal bermudagrass are well suited.

The potential is high for urban use. It is low for recreational use. The sandy surface layer is a limitation.

Capability subclass IVs; woodland group 3s2; Sandy grazing group.

23—Houston Black clay, 1 to 3 percent slopes. This deep soil is on convex uplands. Areas are long to oval and range from 10 to 100 acres.

The surface layer is very firm, moderately alkaline, black clay about 27 inches thick. From 27 to 45 inches is very firm, moderately alkaline, very dark gray clay. The underlying material to 65 inches is very firm, moderately alkaline, gray clay.

The Houston black clay is moderately well drained. Runoff is medium. Permeability is rapid when the soil is dry and cracked and is very slow when it is wet. The available water capacity is high. Tilth is good, but the soil can be worked within only a limited range of moisture content. The root zone is deep but is somewhat difficult to penetrate.

Included in mapping are small areas of Leson and Redco soils. Also included are areas of soils that do not have intersecting slickensides but are otherwise similar to Houston Black soils. Included soils make up less than 25 percent of any one mapped area.

This soil is used mainly for pasture. The potential for pasture is high. Common bermudagrass, dallisgrass, and burclover are well suited. Small areas are in native bluestem grasses. The potential is high for cultivated crops, but only a small acreage is cropped. The principal crops are cotton, corn, small grain, and forage.

This soil has low potential for urban and recreational uses. It shrinks and swells with changes in moisture content, it has low strength, and it corrodes uncoated steel. The clay texture and permeability limit recreational use.

Capability subclass IIe; Blackland range site.

24—Houston Black-Urban land complex, 1 to 3 percent slopes. This map unit is on convex uplands. Areas are irregular to oval and are about 50 acres.

This unit is 20 to 50 percent Houston Black soils, 30 to 70 percent Urban land, and 10 to 20 percent other soils. These soils are so intricately mixed that mapping them separately is not practical at the scale selected for mapping.

The Houston Black soil has a surface layer of very firm, moderately alkaline, black clay about 27 inches thick. From 27 to 45 inches is very firm, moderately alkaline, very dark gray clay. The underlying material to 65 inches is very firm, moderately alkaline, gray clay.

The Houston Black soil is moderately well drained. Permeability is very slow, and runoff is rapid. Available water capacity is high.

Urban land consists of works, structures, and areas where the soil has been altered or so obscured by cutting, filling, or grading that classification is not possible.

Included in mapping are small areas of Ferris and Leson soils. Included soils make up less than 20 percent of the map unit.

Streets, roads, and driveways are difficult to keep smooth, foundations may crack, and water mains and gas lines may come apart because the soil shrinks and swells with changes in moisture content. Large amounts of fertilizer and water are needed to establish lawns, shrubs, and trees.

25—Kaman clay, occasionally flooded. This nearly level soil is on flood plains. It is inundated once every 3 to 7 years for a period of about 3 weeks. Slopes are 0 to 1 percent. Areas are irregular to long and range from 50 to 300 acres.

The surface layer is very firm, medium acid, black clay about 33 inches thick. The underlying material to a depth of 65 inches is very firm, dark gray clay that is slightly acid.

This soil is poorly drained, and the available water capacity is high. Permeability and runoff are very slow. Tilth is good, but the soil can be worked within only a very limited range of moisture content. The root zone is deep but is somewhat difficult to penetrate.

Included in mapping are small areas of Trinity soils. Included soils make up less than 15 percent of any one mapped area.

The soil is used for crops, pasture, and hardwood timber. The potential for all is high. Cotton, corn, small grain, and silage are the principal crops. Common bermudagrass, dallisgrass, and burclover are well suited. Hackberry, water oak, willow oak, green ash, and elm are well suited hardwoods.

This soil has low potential for urban and recreational uses. It shrinks and swells with change in moisture, it has low strength, and it corrodes uncoated steel. The clay texture and wetness restrict recreational use.

Capability subclass IIw; woodland group 1w6; Clayey Bottomland grazing group.

26—Kaman-Elysian Variant complex, 0 to 2 percent slopes. This map unit is on low stream terraces. Areas are long to irregularly shaped and range from 100 to 300 acres.

This unit is about 44 percent Kaman soil, 22 percent the Elysian variant, and 34 percent other soils. These soils are so intricately mixed that mapping them separately is not practical at the scale selected for mapping.

The Kaman soil has a plane to slightly concave surface. The surface layer is very firm, medium acid, black clay about 33 inches thick. The underlying material to 65 inches is very firm, dark gray clay that is very slightly acid.

The Kaman soil is poorly drained. It is rarely flooded. Permeability and runoff are very slow. Available water capacity is high. Tilth is good, but the soil can be worked within only a very limited range of moisture content. The root zone is deep but is somewhat difficult to penetrate.

The Elysian variant is on slightly higher convex ridges. The surface layer is friable, slightly acid, brown fine sandy loam about 17 inches thick. Between 17 and 29 inches is friable, slightly acid, light yellowish brown sandy clay loam. From 29 to 36 inches is friable, medium acid, yellowish brown sandy clay loam that has red mottles and fine pockets and streaks of uncoated sand grains. From 36 to 66 inches is firm, strongly acid, mottled yellowish brown and grayish brown clay that has fine pockets and streaks of uncoated sand grains. From 66 to 80 inches is very friable, slightly acid, light brownish gray loamy sand and thin bands of more clayey material that is mottled strong brown and yellowish red.

The Elysian variant is well drained. Permeability is moderate, and runoff is slow. Available water capacity is medium. The soil has excellent tilth and can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated. Flooding is not a problem.

Included in mapping are soils that are sandy to a depth of more than 80 inches. Also included are areas of Kaufman and Trinity soils. Included soils make up 34 percent of the map unit.

This unit is used for cultivated crops, pasture, and timber. It has high potential for all three. Cotton, corn, and silage crops are well suited to the Kaman soil. Garden crops, melons, and fruit trees are well suited to the Elysian variant. Common bermudagrass and Coastal bermudagrass are well suited. Hardwood timber, such as hackberry, water oak, willow oak, green ash, and elm, is well suited to the Kaman soil. Loblolly pine and shortleaf pine are well suited to the Elysian variant.

This unit has low potential for urban use. Both soils shrink and swell with changes in moisture content, they have a high water table in winter, and they corrode uncoated steel. The Kaman soil has low potential for recreational use because of the clay surface layer and the wetness. The Elysian variant has medium potential for recreational use because it is wet and water moves through it slowly.

Capability subclass IIw Kaman soil, IIe Elysian variant; woodland group 1w6 Kaman soil, 3w7 Elysian variant; Clayey Bottomland grazing group Kaman soil, Sandy Loam group Elysian variant.

27—Kanebreak soils, frequently flooded. These deep soils are on flood plains. They are inundated about twice a year for periods of 2 to 7 days. Slopes are 0 to 1 percent. Areas are long and range from 20 to 300 acres.

The texture of the surface layer varies from fine sandy loam to sandy clay loam. The soils are not uniform and do not occur in a regular pattern.

Typically the surface layer is about 8 inches of friable, medium acid, very dark grayish brown fine sandy loam mottled with brown. From 8 to 14 inches is friable, slightly acid, very dark grayish brown fine sandy loam mottled with brown. From 14 to 20 inches is firm, neutral, very dark grayish brown sandy clay loam mottled with dark reddish brown. From 20 to 28 inches is firm, mildly alkaline, very dark grayish brown sandy clay loam that has brown mottles and a few thin strata of very pale brown fine sandy loam. Between 28 and 41 inches is friable, moderately alkaline, grayish brown fine sandy loam and a few thin strata of sandy clay loam. The underlying material to a depth of 70 inches is friable, moderately alkaline, light brownish gray very fine sandy loam and a few thin clay and clay loam strata.

These soils are somewhat poorly drained. Available water capacity is medium. Permeability and surface runoff are slow. Tilth is good, but the soil can be worked within only a moderate range of moisture content. The root zone is deep and is easily penetrated.

Included in mapping are small areas of Gowker, Kaman, Kaufman, and Trinity soils and small areas of recent overwash. Included soils make up about 20 percent of the map unit.

This unit is used mainly for pasture and timber. The potential is medium for pasture. Common bermudagrass, Coastal bermudagrass, and bahiagrass are well suited. The potential is high for hardwood timber. Hackberry, willow oak, green ash, and elm are well suited. The unit is inundated so frequently that cultivation is not feasible or practical.

The potential is low for urban and recreational uses. Frequent flooding, wetness, and the risk of corrosion to uncoated steel are the main limiting features.

Capability subclass Vw; woodland group 2w8; Loamy Bottomland grazing group.

28—Kaufman clay, occasionally flooded. This deep soil is on flood plains. It is inundated about once every 3 to 7 years for periods of 2 to 7 days. Slopes are 0 to 1 percent. Areas are long to irregularly shaped and range from 50 to 500 acres.

The surface layer is very firm, slightly acid, black clay about 30 inches thick. From 30 to 43 inches is very firm, medium acid, very dark gray clay. The underlying material to a depth of 65 inches is very firm, neutral, dark gray clay.

The soil is somewhat poorly drained and has a high available water capacity. Permeability is very slow, and runoff is slow. Tilth is good, but the soil can be worked within only a very limited range of moisture content. The root zone is deep but is difficult to penetrate.

Included in mapping are soils that do not have a black surface layer. Included soils make up to 30 percent of any one mapped area.

This soil is used for crops, pasture, and hardwood timber. The potential is high for all three. Cotton, corn, and silage crops are well suited. Common bermudagrass, Coastal bermudagrass, and dallisgrass are the principal pasture plants. Hackberry, water oak, willow oak, green ash, and elm are the most common hardwoods.

The soil has low potential for urban and recreational uses. It shrinks and swells, it is wet at times, and it corrodes uncoated steel. The clay surface layer and the wetness restrict recreational use.

Capability subclass IIw; woodland group 1w6; Clayey Bottomland grazing group.

29—Kaufman-Gowker complex, frequently flooded. This map unit consists of deep soils on flood plains that are inundated about twice a year for periods of 2 to 7 days. Slopes are 0 to 1 percent. Areas are long and range from 50 to 400 acres.

This unit is about 49 percent Kaufman soils, 37 percent Gowker soils, and 14 percent other soils. These soils are so intricately mixed that mapping them separately is not practical at the scale selected for mapping.

The level Kaufman soil occupies the backwater area of the unit. The surface layer is very firm, slightly acid, black clay about 30 inches thick. From 30 to 43 inches is very firm, medium acid, very dark gray clay. The underlying material to a depth of 65 inches is very firm, neutral, dark gray clay.

The Kaufman soil is somewhat poorly drained. Permeability is very slow, and runoff is slow. Available water capacity is high. Tilth is good, but the soil can be worked within only a very limited range of moisture content. The root zone is deep but is difficult to penetrate.

The Gowker soil is adjacent to stream channels. It has a surface layer of firm, slightly acid, very dark gray clay loam about 9 inches thick. Between 9 and 30 inches is firm, slightly acid, black clay loam and a few thin streaks and strata of dark brown clay loam. From 30 to 34 inches is very firm, neutral, very dark gray clay. From 34 to 44 inches is very firm, slightly acid, dark gray clay mottled with brown. The underlying material from 44 to 60 inches is firm, slightly acid, grayish brown sandy clay loam mottled with reddish brown.

The Gowker soil is moderately well drained. Available water capacity is high. Permeability and runoff are slow. Tilth is good, but the soil can be worked within only a moderate range of moisture content. The root zone is deep and is easy to penetrate.

This unit is used for pasture and timber. The potential for pasture is high. Common bermudagrass, Coastal bermudagrass, dallisgrass, and bahiagrass are well suited. The potential for hardwood timber is high. Hackberry, water oak, willow oak, green ash, and elm are well suited.

This unit has low potential for urban and recreational uses. Frequent flooding, wetness, and the shrink-swell potential are limitations.

Capability subclass Vw; woodland group 1w6 Kaufman soils, 1w5 Gowker soils; Clayey Bottomland grazing group Kaufman soils, Loamy Bottomland group Gowker soils.

30—Kershaw sand, 0 to 5 percent slopes. This deep soil is on uplands. Areas are oval to long and range from 15 to 60 acres.

The surface layer is loose, strongly acid, grayish brown sand about 6 inches thick. From 6 to 68 inches is loose, strongly acid, very pale brown sand. The underlying material to 80 inches is loose, very strongly acid, very pale brown sand.

This soil is excessively drained and has a very low available water capacity. Permeability is very rapid, and runoff is slow. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated.

Included in mapping are areas where sandstone is at a depth of less than 80 inches. Some areas have a sandy clay loam subsoil at 72 inches. Included soils make up less than 15 percent of any one mapped area.

This soil is used mainly for timber. The potential is low for pine timber. Longleaf pine and slash pine are best suited. A small acreage is in pasture. The potential is low for pasture. Coastal bermudagrass and bahiagrass are best suited.

The soil has high potential for urban use and low potential for recreational use. Parts of some areas have been removed for use as fill sand in foundations. The loose sandy surface layer restricts recreational use.

Capability subclass VIIs; woodland group 5s3; Deep Sand grazing group.

31—Kitterll-Rock outcrop complex, 1 to 10 percent slopes. This mapping unit is on uplands. Areas range from 10 to 100 acres.

This unit is about 34 percent Kitterll soil, 34 percent Rock outcrop, and 32 percent other soils (fig. 10). The soils are so intricately mixed that mapping them separately is not possible at the scale selected for mapping.

The Kitterll soil is in the less sloping, convex parts of the unit. The surface layer is friable, slightly acid, grayish brown fine sandy loam about 6 inches thick. The underlying material is gray, tuffaceous sandstone.

The Kitterll soil is well drained. Permeability is moderate and runoff is very rapid. Available water capacity is very low. Tilth is fair, and the soil can be worked within only a moderate range of moisture content. The root zone is very shallow but is easy to penetrate.

The Rock outcrop is gray, tuffaceous sandstone. In some areas where the slope is less than 5 percent, bare,

solid slabs of sandstone are at the surface. Also on the surface in many areas is loose rock 5 to 20 inches in diameter. At the base of slopes are many large boulders.

Included in mapping are small areas of Falba soils and soils similar to the Kitterll soil but have a thin subsoil. Also included are areas where slopes are up to 20 percent. Included soils make up about 32 percent of the map unit.

This unit is used mainly for range, but the potential is low. Native grasses are best suited. Some areas have stands of shortleaf pine and hardwood timber, but the potential is also low for timber.

The potential is low for urban and recreational uses because of slope and depth to bedrock.

Capability subclass VIIs; Shallow grazing group.

32—Landman association, gently undulating. These deep soils are on convex river terraces. Slopes are 1 to 5 percent. Areas are long and range from 20 to 150 acres.

This map unit is about 83 percent Landman soils and 17 percent other soils.

The surface layer is very friable, slightly acid, very dark grayish brown loamy fine sand about 7 inches thick. Between 7 and 43 inches is loose, slightly acid, light yellowish brown loamy fine sand. From 43 to 74 inches is friable, slightly acid, light yellowish brown loamy fine sand with thin dark brown bands. From 74 to 80 inches is firm, strongly acid, mottled grayish brown, yellowish brown, and red sandy clay loam.

The soil is moderately well drained and has a low available water capacity. Permeability is rapid in the loamy fine sand and moderately slow in the sandy clay loam. There is no runoff. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep and is very easy to penetrate.

Included in mapping are small areas of Depcor soils. Also included are areas where the loamy fine sand is more than 80 inches thick and some areas where it is less than 40 inches thick. Included soils make up about 17 percent of the map unit.

This unit is used mainly for timber. Potential for pine timber is high. Loblolly pine, shortleaf pine and slash pine are well suited. The unit has high potential for pasture. Common bermudagrass and Coastal bermudagrass are well suited. A very limited acreage is cultivated. The potential for cultivated crops is medium. Melons, peas, and garden crops are well suited. The potential is high for urban use. It is only medium for recreational use. The sandy surface layer is a limitation.

Capability subclass IIIw; woodland group 2s2; Sandy grazing group.

33—Leson clay, 0 to 3 percent slopes. This deep soil is on uplands. Areas are oval to long and range from 10 to 150 acres.

The surface layer is firm, neutral, black clay about 21 inches thick. Between 21 and 30 inches is firm, neutral, very dark gray clay mottled with light brownish gray. The underlying material to 60 inches is very firm, moderately alkaline, grayish brown clay mottled with yellow.

This soil is moderately well drained and has a medium available water capacity. Runoff is medium. Permeability is rapid when the soil is dry and cracked and is very slow when the soil is wet. Tilth is fair, and the soil can be worked within only a very limited range of moisture content. The root zone is deep and is somewhat difficult to penetrate.

Included in mapping are small areas of Redco and Houston Black soils. Included soils make up less than 15 percent of any one mapped area.

This soil is used mainly for pasture. The potential for pasture is high. Dallisgrass, Common bermudagrass, and bahiagrass are well suited. A small acreage is in row crops. Cotton, corn, silage, and grains are well suited. Only a limited acreage is in hardwood timber.

This clay soil has low potential for urban and recreational uses. It has a high shrink-swell potential and corrodes uncoated steel. The clay texture and the very slow permeability restrict use for recreation.

Capability subclass IIe; Blackland range site.

34—Lufkin fine sandy loam, 0 to 1 percent slopes. This deep soil is on stream terraces. Areas are irregularly shaped and range from 15 to 75 acres.

The surface layer is friable, slightly acid, grayish brown fine sandy loam about 5 inches thick. From 5 to 9 inches is friable, slightly acid, light gray fine sandy loam mottled with dark yellowish brown. Between 9 and 26 inches is very firm, very strongly acid, grayish brown clay mottled with dark red. From 26 to 37 inches is very firm, slightly acid, gray clay mottled with dark yellowish brown. Between 37 and 55 inches is very firm, moderately alkaline, dark gray clay. From 55 to 63 inches is very firm, moderately alkaline, gray clay mottled with yellowish brown. The underlying material to 75 inches is very firm, moderately alkaline, grayish brown clay.

This soil is somewhat poorly drained and has a medium available water capacity. Permeability is very slow, and runoff is slow. Tilth is fair, and the soil can be worked within only a moderate range of moisture content. The root zone is deep, but generally roots are adversely affected by the wetness and the heavy clay subsoil.

Included in mapping are small areas where the surface layer is more than 10 inches thick and some areas where small sandy mounds are on the surface. Included soils make up less than 15 percent of any one mapped area.

This soil is used mainly for pasture and timber. It has medium potential for pasture. Common bermudagrass, Coastal bermudagrass, and dallisgrass are well suited.

The potential is low for timber. Loblolly pine and shortleaf pine are best suited.

The soil has low potential for urban and recreational uses. It shrinks and swells with changes in moisture, it is wet during the rainy season, and it corrodes uncoated steel. Wetness and the very slow permeability restrict recreational use.

Capability subclass IIIw; woodland group 5w2; Tight Sandy Loam grazing group.

35—Lufkin-Annona association, nearly level. This map unit is on old stream terraces. Slopes are 0 to 1 percent. Areas are irregularly shaped and are about 400 acres.

This unit is about 50 percent Lufkin soil, 35 percent Annona soil, and 15 percent other soils. Some areas of Lufkin and Annona soils are large enough to be mapped separately. The soils, however, are so similar in use and management that mapping them separately is not justified at the scale selected for mapping.

The Lufkin soil has a plane to slightly concave surface. The surface layer is friable, slightly acid, brownish gray fine sandy loam about 7 inches thick. From 7 to 12 inches is very firm, medium acid, light brownish gray clay mottled with strong brown. From 12 to 24 inches is very firm, medium acid, gray clay mottled with strong brown and red. Between 24 and 35 inches is very firm, neutral, mottled light brownish gray and yellowish brown clay. From 35 to 60 inches is very firm, moderately alkaline, gray clay.

The Lufkin soil is somewhat poorly drained. Permeability is very slow and runoff is slow. Available water capacity is medium. Tilth is fair, and the soil can be worked within only a moderate range of moisture content. The root zone is deep, but generally the roots are adversely affected by wetness and the heavy clay subsoil.

The Annona soil has a slightly convex surface. The surface layer is friable, slightly acid, dark grayish brown fine sandy loam about 4 inches thick. From 4 to 9 inches is friable, slightly acid, brown fine sandy loam mottled with dark brown. Between 9 and 37 inches is very firm, very strongly acid, mottled light brownish gray, red, and yellowish clay. From 37 to 57 inches is very firm, strongly acid, light brownish gray clay mottled with reddish yellow and yellowish red. The underlying material to 65 inches is very firm, slightly acid, mottled gray, red, and reddish yellow clay.

The Annona soil is somewhat poorly drained. Permeability is very slow, and runoff is slow. Available water capacity is high. Tilth is fair, and the soil can be worked within only a moderate range of moisture content. The root zone is deep but is very difficult to penetrate.

Included in mapping are small areas of Huntsburg soils. Included areas make up about 15 percent of any one mapped area.

This unit is used mainly for timber. The potential for timber is medium for the Annona soil and low for the Lufkin soil. Loblolly pine and slash pine are best suited. A large acreage has been established to pine plantations. A very small acreage is used for pasture, for which the potential is medium.

Potential is low for urban and recreational uses. The soil shrinks and swells with changes in moisture content, it is wet for long periods each year, and it corrodes uncoated steel. Wetness and very slow permeability restrict recreational use.

Capability subclass IIIw; woodland group 5w2 Lufkin soil, 3c3 Annona soil; Tight Sandy Loam grazing group.

36—Moten fine sandy loam, 0 to 2 percent slopes. This deep soil is on old stream terraces and gently sloping depressional uplands. Areas are irregularly shaped and long and range from 100 to 600 acres.

The surface layer is friable, medium acid, dark grayish brown fine sandy loam about 4 inches thick. Between 4 and 21 inches is friable, strongly acid, grayish brown fine sandy loam. From 21 to 36 inches is friable, very strongly acid, dark grayish brown fine sandy loam. From 36 to 46 inches is firm, slightly acid, dark grayish brown sandy clay loam. The underlying material from 46 to 75 inches is firm, mildly alkaline, brown clay.

This soil is somewhat poorly drained and has a medium available water capacity. Permeability and surface runoff are slow. Tilth is fair, and the soil can be worked within only a moderate range of moisture content. The root zone is deep and easy to penetrate.

Included in mapping are small areas of Goreen soils. Included soils make up less than 20 percent of any one mapped area.

This soil is used mainly for pine timber. The potential is medium. A small acreage is in pasture. The potential is also medium for pasture. Common bermudagrass, Coastal bermudagrass, and kobe lespedeza are well suited.

The soil has low potential for urban and recreational uses. Wetness is the limiting feature.

Capability subclass IIw; woodland group 3w2; Flatwoods grazing group.

37—Nugent soils, frequently flooded. These soils are on natural levees adjacent to stream channels. They are inundated two or three times each year for periods of about 3 days to 3 weeks. Slopes are 0 to 1 percent. Areas are long and range from 10 to 150 acres.

Nugent soils have a variable surface layer ranging in texture from loamy sand to loamy fine sand. They are not uniform and do not occur in a regular pattern.

The surface layer is very friable, slightly acid, brown loamy sand about 10 inches thick. From 10 to 22 inches is loose, slightly acid, pale brown sand. The underlying material to 80 inches is loose, slightly acid, very pale brown sand.

These soils are excessively drained and have a low available water capacity. Permeability is moderately rapid, and runoff is slow. The soil can be worked

throughout a wide range of moisture content. The root zone is deep and is very easy to penetrate.

Included in mapping are small areas of Kanebreak and Gowker soils. Also included are small areas that have a sandy clay loam subsoil at a depth of less than 60 inches. Included soils make up less than 15 percent of any one mapped area.

These soils are used mainly for pasture. The potential is medium. Common bermudagrass and Coastal bermudagrass are well suited. A small acreage is in timber, for which the potential is high. Loblolly pine is well suited.

Potential for urban and recreational uses is low because of frequent flooding and the sandy surface layer.

Capability subclass Vw; woodland group 2s7; Loamy Bottomland grazing group.

38—Pits. This map unit is on uplands. It consists of excavation sites 3 to 75 feet deep. Areas range from 3 to 70 acres.

The excavated material was used for base material for roads, for driveway topping, and for fill in major building construction.

Some of the larger pits hold water well and have high potential for recreational use.

39—Redco clay, 0 to 2 percent slopes. This deep soil is on uplands. Areas are long to oval and range from 10 to 150 acres.

The surface layer is firm, slightly acid, very dark grayish brown clay about 7 inches thick. From 7 to 18 inches is very firm, strongly acid, light brownish gray clay mottled with strong brown. Between 18 and 40 inches is very firm, strongly acid, light gray clay mottled with gray clay. From 40 to 52 inches is very firm, slightly acid, grayish brown clay mottled with reddish brown. The underlying material to a depth of 72 inches is very firm, mildly alkaline, light gray clay mottled with yellowish brown.

This soil is poorly drained and has a high available water capacity. Permeability and runoff are very slow. Tilth is poor, and the soil can be worked within only a very limited range of moisture content. The root zone is deep but is very difficult to penetrate.

Included in mapping are small areas that do not have a mottled subsoil. Included soils make up about 20 percent of any one mapped area.

This soil is used for pasture, timber, and cultivated crops. The potential is high for pasture. Coastal bermudagrass, dallisgrass, and bahiagrass are well suited. The potential is medium for pine timber. Shortleaf pine and loblolly pine are well suited. The potential is medium for cultivated crops. Cotton, corn, grains, and forage are suited.

The soil has low potential for urban and recreational uses. It shrinks and swells, it has low strength, and it corrodes uncoated steel. The clay texture and the wetness restrict recreational uses.

Capability subclass IIIe; woodland group 3c8; Blackland grazing group.

40—Rosenwall-Goreen association, gently undulating. This map unit is on interstream divides on uplands. Slopes are 1 to 5 percent. Areas are irregularly shaped and range from 10 to 100 acres.

This unit is about 41 percent Rosenwall soils, 22 percent Goreen soils, and 37 percent other soils. Some areas of Rosenwall and Goreen soils are large enough to be mapped separately. But the soils are so similar in use and management that mapping them separately is not justified at the scale selected for mapping.

The Rosenwall soil is in the more sloping, convex areas. The surface layer is friable, slightly acid, brown fine sandy loam about 6 inches thick. Between 6 and 12 inches is firm, very strongly acid, dark red clay. From 12 to 16 inches is firm, very strongly acid, dark red clay mottled with brown and yellowish red. From 16 to 20 inches is firm, very strongly acid, reddish brown clay mottled with red and grayish brown. From 20 to 27 inches is firm, very strongly acid, dark reddish gray clay stratified with gray shaly clay. The underlying material from 27 to 30 inches is strongly cemented sandstone stratified with gray shale.

The Rosenwall soil is moderately well drained. Permeability is very slow, and runoff is medium. The available water capacity is low. Tilth is fair, and the soil can be worked within only a limited range of moisture content. The root zone is moderately deep and is somewhat difficult to penetrate.

The Goreen soil is in the lower, concave areas. The surface layer is friable, very strongly acid, grayish brown fine sandy loam about 13 inches thick. From 13 to 26 inches is firm, very strongly acid, dark brown clay mottled with red. Between 26 and 31 inches is firm, very strongly acid, dark brown clay mottled with yellowish red. The underlying material from 31 to 40 inches is weakly cemented sandstone interbedded with brown shaly clay.

The Goreen soil is somewhat poorly drained. Permeability is very slow and runoff is medium. Available water capacity is low. Tilth is fair, and the soil can be worked within only a very limited range of moisture content. The root zone is moderately deep and is very difficult to penetrate.

Included in mapping are small areas of soils less than 20 inches thick to bedrock and areas where the fine sandy loam is more than 20 inches thick.

This unit is used for timber. It has medium potential for pine timber. Loblolly pine (fig. 11) and shortleaf pine are well suited. Many areas are in pine plantations. A small acreage is in pasture, for which the potential is low. Common bermudagrass and Coastal bermudagrass are well suited.

The unit has low potential for urban use. It shrinks and swells, it is wet at times, and it corrodes uncoated steel. The Rosenwall soil has only medium potential for recre-

ational use because of the very slow permeability. The Goreen soil has low potential for recreational use because of the very slow permeability and the wetness.

Capability subclass IVe; woodland group 4c2; Tight Sandy Loam grazing group.

41—Trinity soils, frequently flooded. These soils are on flood plains and are inundated about twice each year for periods of 2 to 7 days. Slopes range from 0 to 1 percent. Areas are long and range from 20 to 200 acres.

Trinity soils in this unit have a variable surface texture. They are not uniform and do not occur in a regular pattern.

The surface layer is firm, moderately alkaline, very dark gray clay about 11 inches thick. From 11 to 41 inches is firm, moderately alkaline, black clay. The underlying material to 60 inches is firm, moderately alkaline, very dark gray clay.

These soils are somewhat poorly drained and have a high available water capacity. Permeability and surface runoff are very slow. Tilth is good, but the soil can be worked within only a very limited range of moisture content. The root zone is deep and is easy to penetrate.

Included in mapping are small areas of Kaufman and Gladewater soils. Included areas make up less than 20 percent of any one mapped area.

This soil is used mainly for pasture and hardwood timber. The potential is high for pasture. Common bermudagrass, Coastal bermudagrass, dallisgrass, and bahiagrass are well suited. The potential is high for hardwood timber. Hackberry, water oak, green ash, and pecan are well suited.

These soils have low potential for cultivated crops. Frequent flooding makes cultivation so difficult that it is not practical.

These soils have low potential for urban and recreational uses. They shrink and swell with changes in moisture content, and they are wet at times and frequently flooded.

Capability subclass Vw; woodland group 1w6; Clayey Bottomland grazing group.

42—Woden fine sandy loam, 0 to 3 percent slopes. This deep soil is on convex uplands. Areas are irregularly shaped and range from 50 to 150 acres.

The surface layer is very friable, slightly acid, dark brown fine sandy loam about 20 inches thick. From 20 to 33 inches is friable, slightly acid, reddish brown fine sandy loam. From 33 to 44 inches is friable, slightly acid, yellowish red fine sandy loam. Between 44 and 80 inches is friable, slightly acid, reddish brown fine sandy loam.

Woden soil is well drained and has a medium available water capacity. Permeability is moderately rapid, and surface runoff is slow. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep and is very easy to penetrate.

Included in mapping are small areas of Gunter, Annona, and Depcor soils. Included soils make up about 15 percent of any one mapped area.

This soil is used mainly for pasture. The potential is high. Common bermudagrass and Coastal bermudagrass are well suited. A small acreage is in pine timber, for which the potential is high. Loblolly pine and slash pine are well suited. The potential is high for urban and recreational uses.

Capability subclass IIe; woodland group 1o7; Sandy Loam grazing group.

43—Woodtell fine sandy loam, 1 to 3 percent slopes. This deep soil is on uplands. Areas are long to irregularly shaped and range from 175 to 400 acres.

The surface layer is friable, strongly acid, light yellowish brown fine sandy loam about 7 inches thick. From 7 to 13 inches is firm, very strongly acid, red clay. Between 13 and 24 inches is firm, very strongly acid, mottled reddish brown and grayish brown clay. From 24 to 32 inches is very firm, very strongly acid, mottled grayish brown and dark red clay. From 32 to 58 inches is firm, very strongly acid, mottled dark yellowish brown and brown clay. The underlying material to 80 inches is friable, very strongly acid, light brownish gray clay loam mottled with brownish yellow and brown.

This soil is moderately well drained and has a medium available water capacity. Permeability is very slow, and surface runoff is medium. Tilth is fair, and the soil can be worked within only a moderate range of moisture content. The root zone is deep and is somewhat difficult to penetrate.

Included in mapping are small areas of Arol, Depcor, Elmina, and Falba soils. Included soils make up less than 15 percent of any one mapped area.

This soil is used mainly for pasture and timber. The potential for pasture is high. Common bermudagrass, Coastal bermudagrass, and bahiagrass are well suited. The potential for pine timber is medium. Loblolly pine and shortleaf pine are well suited.

The potential for urban use is low. The potential for recreational use is low for camp areas and playgrounds, but is high for picnic areas and for paths and trails. The soil shrinks and swells, it is very slowly permeable, and it corrodes uncoated steel.

Capability subclass IIIe, woodland group 4c2; Tight Sandy Loam grazing group.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture, range, and woodland; as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities; and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

More than 114,951 acres in the survey area was used for crops and pasture in 1967, according to the Conservation Needs Inventory of Texas (*7*). Of this total 103,428 acres was used for permanent pasture; and 11,523 acres for crops, most of which were row feed crops, corn, and small grains.

Cultivated crops

The potential is poor for increased production of food crops in Walker County. Soils along the Trinity River and other streams have high potential for crop yields, but most of these areas are subject to frequent damaging overflow and are not suited to crop production. In general, soils in the openland of the county have low natural fertility, low content of organic matter, and medium available water capacity. Many have a heavy clayey subsoil that absorbs water very slowly and retains a high percentage of moisture that is not available to plants.

Erosion is a problem on a limited acreage of pastureland. This acreage was cropped and subsequently eroded. Examples of soils on this acreage are Falba and Arol soils, 1 to 5 percent slopes, eroded; Ferris clay, 1 to 5 percent slopes; and Ferris clay, gullied. Management during recent years has included land smoothing, sloping gullies, and establishing suitable base grasses.

Diversions reduce the length of slopes and therefore reduce runoff and the risk of erosion. They are limited in controlling and diverting water from eroded areas, however, unless gullies are sloped and the land is smoothed. They can be planned and installed on most soils in the county, except on sandy soil more than 20 inches deep, for example, Depcor soils.

Drainage is needed in wet areas in pasture on stream bottoms of the county. These areas, adjacent to hills, stand in water for long periods in winter and spring or during exceptionally wet years. Drainage is limited to those areas having good outlets. Grass can be planted in the shallow waterways. Soils on stream bottoms that can be successfully drained are Gladewater, Gowker, Kaman, Kanebreak, Kaufman, and Trinity soils.

Fertility is naturally low in most upland soils. Houston Black clay and Leson clay are the only exceptions.

Most upland soils are acid. Unless the soils are limed, the production of pasture grass will not be high. The clayey Blackland soils are mostly slightly acid to mildly alkaline. On all soils, additions of lime and fertilizer should be based on the result of soil tests, on the need of the crop or grasses, and on the expected level of yield.

Tilth is an important factor in the germination of seed and the infiltration of water. Soils with good tilth are granular and porous.

Soils that are cropped are the clays, the fine sandy loams, and the loamy fine sands. They are generally low in organic-matter content. Soil structure is poor. Intense rains cause the soils to pack and crust, which limits germination, reduces infiltration, and increases runoff. The clayey Houston Black, Leson, and Redco soils pack easily and have poor seed germination. Fine sandy loams that crust are Arol, Annona, and Falba soils. Regular additions of crop residue, manure, and other organic matter improve soil structure and reduce crust formation.

Field crops suited to the soils and climate of the county are cotton, corn, and grain sorghum. Special crops are garden crops, small truck crops, fruit trees, berries, Irish potatoes, sweet potatoes, many kinds of peas, and sugarcane. These crops are grown on bottom land and low terraces along the Trinity River where they are protected by a levee system.

Pasture

Pasture is difficult to develop because the soils in general are low in natural fertility, low in supply of organic matter, and medium in available water capacity. On many acid upland soils such as Depcor, Annona, Elmina, and Arriola soils, lime and fertilizer are needed for yields of sufficiently high good quality forage. Suitable grasses are common bermudagrass, Coastal bermudagrass, bahiagrass, and kleingrass.

The clayey upland soils—Houston Black, Leson, and Redco soils—for the most part are slightly acid to moderately alkaline. They require large amounts of fertilizer. In places the Leson and Redco soils also need small amounts of lime. Adapted grasses are common bermudagrass, Coastal bermudagrass, dallisgrass, johnsongrass, and fescues.

Soils on stream bottoms, such as Gladewater, Gowker, Kaman, Kaufman, and Trinity soils, generally produce good pasture. These clayey soils are high in natural fertility, high in available water capacity, and moderately low in supply of organic matter. They respond to applications of fertilizer, but the fertilizer must be applied carefully because the soils are subject to frequent damaging overflow. Adapted grasses are common bermudagrass, Coastal bermudagrass, dallisgrass, and bahiagrass.

The Kanebreak soil, a sandy loam on bottom land, is subject to frequent damaging overflow. It is medium acid. Applications of lime as well as fertilizer are beneficial. Adapted grasses are common bermudagrass, Coastal bermudagrass, bahiagrass, and fescues.

The Nugent soils, which are strongly acid sandy soils on bottomlands, also are subject to frequent damaging overflow. They are low in natural fertility, available water capacity, and supply of organic matter. Extreme care is needed in applying lime and fertilizer. Adapted grasses are common bermudagrass, Coastal bermudagrass, and bahiagrass.

Latest information and suggestions on growing crops and pasture grasses can be obtained from the local office of the Cooperative Extension Service and the Soil Conservation Service.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In the capability system, all kinds of soil are grouped at two levels: capability class and subclass. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use. (none in county.)

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and landforms have limitations that nearly preclude their use for commercial crop production. (none in county.)

Capability subclasses are soil groups within one class; they are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e*

shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is indicated in table 6. All soils in the survey area except Pits and Urban land complexes are included. Some of the soils that are well suited to crops and pasture may be in low-intensity use, for example, soils in capability classes II and III. Data in this table can be used to determine the farming potential of such soils.

The capability subclass is identified in the description of each soil mapping unit in the section "Soil maps for detailed planning." Capability units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Thus, the capability unit is a convenient grouping for making many statements about management of soils.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 7. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Pasture yields were estimated for common and improved bermudagrass. A few farmers may be obtaining average yields higher than those shown in table 7.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

The estimated yields reflect the productive capacity of the soils for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 7 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Range

Range is of minor importance in Walker County. Less than 2 percent of the area supports native range plants. On most ownerships the forage produced on range is used as winter grazing and is supplemented with protein concentrate.

Livestock also graze woodland understory. This is discussed more fully in the section "Woodland understory vegetation."

Where climate and topography are about the same, differences in the kind and amount of vegetation that rangeland can produce are related closely to the kind of soil. Effective management is based on the relationships among soils, vegetation, and water.

Table 8 shows, for each kind of soil, the name of the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the expected percentage of each species in the composition of the potential natural plant community. Soils not listed cannot support a natural plant community of predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. The following are explanations of column headings in table 8.

A *range site* is a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community. Soils that produce a similar kind, amount, and proportion of range plants are grouped into range sites. For those areas where the relationship between soils and vegetation has been established, range sites can be interpreted directly from the soil map. Properties that determine the capacity of the soil to supply moisture and plant nutrients have the greatest influence on the productivity of range

plants. Soil reaction and a seasonal high water table are also important.

Total production refers to the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year the amount and distribution of precipitation and the temperatures are such that growing conditions are substantially better than average; in a normal year these conditions are about average for the area; in an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight refers to the total air-dry vegetation produced per acre each year by the potential natural plant community. Vegetation that is highly palatable to livestock and vegetation that is unpalatable are included. Some of the vegetation can also be grazed extensively by wildlife.

Characteristic vegetation of grasses, grasslike plants, forbs, and shrubs that make up most of the potential natural plant community on each soil are listed by common name. Under *Composition*, the expected proportion of each species is presented as the percentage, in air-dry weight, of the total annual production of herbaceous and woody plants. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season. Generally all of the vegetation produced is not used.

Range management requires, in addition to knowledge of the kinds of soil and the potential natural plant community, an evaluation of the present condition of the range vegetation in relation to its potential. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the maximum production of vegetation, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Woodland management and productivity

E. C. Wilbur, forester, Soil Conservation Service, assisted in preparing this section.

Table 9 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Map unit symbols for soils suitable for wood crops are listed, and the ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, t, d, c, s, f, and r.

The third part of the symbol, a numeral, indicates the kind of trees for which the soils in the group are best suited and also the degree of hazard or limitation. The numerals 1, 2, and 3 indicate slight, moderate, and severe limitations, respectively, and suitability for needleleaf trees. The numerals 4, 5, and 6 indicate slight, moderate, and severe limitations, respectively, and suitability for broadleaf trees. The numerals 7, 8, 9 indicate slight, moderate, and severe limitations, respectively, and suitability for both needleleaf and broadleaf trees. The numeral 0 indicates that the soils are not suitable for the production of commercial wood crops.

The soils in Walker County are suited to wood crops. Approximately 72 percent of the county or 364,000 acres is commercial forest woodland. Of this acreage approximately 310,000 acres is privately owned. Less than 15 percent is owned by large operating forest industries. The Sam Houston National Forest is managed by the Forest Service.

The principal forest types in Walker County are loblolly pine, shortleaf pine, oak-pine, oak-hickory, and oak-gum-cypress. About 50 percent of the largest acreage of commercial forest is the loblolly-shortleaf pine type. Bottom land hardwoods, oak-gum-cypress, occupy only 9 percent of the total forest land.

Acreage used for forest crops is under good forest management. Severe insect and disease attacks are cyclic and ice or snow damage is rare. The proportion of pine in the forest has increased during the past few years as a result of planting, natural reseeding, and timber stand maintenance.

Although many areas already have adequate stands of pine, much of the forest has less than full capacity of growing stock, and the rate of growth is generally below the potential capability.

The major obstacle to constructive forest management is the encroachment of inferior hardwoods on land best suited to southern pine. If the undesirable species could be utilized or effectively controlled, the result would be

more favorable growing conditions for pine, an increase in production of saleable wood products, and higher per acre economic returns.

In table 9 the soils are also rated for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade or grow if openings are made in the tree canopy. The invading plants compete with native plants or planted seedlings by impeding or preventing their growth. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* means that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Common trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Woodland understory vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. Some types of forest, under proper management, can produce enough understory vegetation to support grazing of livestock or wildlife, or both.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees, the density of the canopy, and the depth and condition of the forest litter. The density of the forest canopy affects the amount of light that understory plants receive during the growing season.

Table 10 shows, for each soil suitable for woodland, the potential for producing understory vegetation. The table also lists the common names of the characteristic vegetation that grows on a specified soil and the percentage composition, by air-dry weight, of each kind of plant. The kind and percentage of understory plants listed in the table are those to be expected where canopy density is most nearly typical of forests that yield the highest production of wood crops.

The total production of understory vegetation is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year the soil moisture is above average during the optimum part of the growing season; in a normal year soil moisture is average; and in an unfavorable year it is below average.

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 11 shows, for each kind of soil, the degree and kind of limitations for building site development; table 12, for sanitary facilities; and table 13, for water management. Table 14 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 11. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, and open ditches. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 11 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 11 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a

flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, and shrink-swell potential are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 12 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, or *poor*, which, respectively, mean about the same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 12 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of

stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 14 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 15 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor.*

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 14 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 15.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 13 the degree of soil limitation and soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Soil and site limitations are expressed as slight, moderate, and severe. *Slight* means that the soil properties and site features are generally favorable for the specified use and that any limitation is minor and easily overcome. *Moderate* means that some soil properties or site features are unfavorable for the specified use but can be overcome or modified by special planning and design. *Severe* means that the soil properties and site features are so unfavorable and so difficult to correct or overcome that major soil reclamation, special design, or intensive maintenance is required.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

The soils of the survey area are rated in table 16 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 16 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 12, and interpretations for dwellings without basements and for local roads and streets, given in table 11.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains,

and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Wildlife habitat

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 17, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, sorghum, wheat, oats, barley, millet, ryegrass, cowpeas, soybeans, and sunflower.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, johnsongrass, lovegrass, switchgrass, bahiagrass, vetch, and clover.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, indiangrass, goldenrod, beggarweed, pokeweed, partridge-pea, fescue, wheatgrass, and grama.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of native plants are oak, sweetgum, elm, hawthorn, dogwood, hickory, blackberry, blueberry, persimmon, sassafras, sumac, hackberry, black walnut, grape, blackhaw, viburnum, bayberry, and briers.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, fir, and cedar.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and moisture. Examples of shrubs are grape, honeysuckle, yaupon, indiancurrant, snowberry, American beautyberry, and berryvines.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or

cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, rushes, sedges, reeds, and cattail.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are waterfowl feeding areas, wildlife watering developments, beaver ponds, and other wildlife ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include bobwhite quail, dove, meadowlark, field sparrow, killdeer, cottontail, and red fox.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, thrushes, woodpeckers, tree squirrels, gray fox, raccoon, and deer.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Rangeland habitat consists of areas of wild herbaceous plants and shrubs. Wildlife attracted to rangeland include white-tailed deer, mourning dove, bobwhite quail, and meadowlark.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features.

Engineering properties

Table 15 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 15 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 15 in the standard terms used by the U.S. Department of Agriculture (*8*). These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*1*).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two

classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The estimated classification, without group index numbers, is given in table 15. Also in table 15 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index is estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 18 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used in an equation that predicts the amount of soil loss resulting from rainfall erosion of cropland. The soil-loss prediction procedure is outlined by the U.S. Department of Agriculture, Agricultural Research Service (*9*), and is useful to guide the selection of practices for soil and water conservation. The soil erodibility factor 'K' is a measure of the rate at which a soil will erode when other factors affecting erosion are constant. Soil-loss tolerance 'T,' sometimes called permissible soil loss, is the maximum rate of soil erosion that will permit a high level of crop productivity to be sustained economically and indefinitely.

Soil and water features

Table 19 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding; and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 19 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation are also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Risk of corrosion as used in table 19, pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*10*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In

this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 20, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid, plus *Ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Hapludults (*Hapl*, meaning simple horizons, plus *udult*, the suborder of Ultisols that have a udic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is clayey, mixed, thermic, Typic Hapludults.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition. An example is the Galilee series, a member of the clayey, mixed, thermic family of Typic Hapludults.

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*8*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or map units, of each soil series are described in the section "Soil maps for detailed planning."

Annona series

The Annona series consists of deep loamy soils on erosional uplands. These soils formed in stratified clayey and loamy sediments of marine and fluvial origin. Slopes are 0 to 10 percent.

Typical pedon of Annona fine sandy loam in an area of Annona association, gently undulating; from the intersection of U.S. Highway 75 and Texas Highway 150 in New Waverly, 5.1 miles east on Texas Highway 150, 0.9 mile northeast on Farm Road 2778, 2.0 miles north on county road, and 100 feet east in a stand of pine:

Ap—0 to 4 inches; brown (7.5YR 5/4) fine sandy loam; weak very fine granular structure; friable; common fine and coarse roots; few small rounded pebbles; slightly acid; abrupt smooth boundary.

B21t—4 to 10 inches; red (2.5YR 5/6) clay; many fine distinct strong brown mottles; moderate fine angular blocky structure; very firm, sticky and plastic; common fine and coarse roots; strongly acid; clear smooth boundary.

B22t—10 to 24 inches; mottled red (2.5YR 5/6) and yellowish brown (10YR 5/6) clay; few fine distinct gray mottles; moderate fine angular blocky structure; very firm, sticky and plastic; few fine and coarse roots; clay films on ped surfaces; some pressure faces evident; medium acid; clear smooth boundary.

B23t—24 to 38 inches; gray (10YR 6/1) clay; common medium prominent red (2.5YR 5/6) and common medium distinct yellowish brown (10YR 5/6) mottles; moderate fine angular blocky structure; very firm, sticky and plastic; few small rounded pebbles; common slickensides that intersect; medium acid; clear smooth boundary.

B24t—38 to 44 inches; yellowish brown (10YR 5/4) clay; common medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8) mottles; moderate fine angular blocky structure; very firm, sticky and plastic; common slickensides that intersect; common black concretions; slightly acid; abrupt wavy boundary.

B25t—44 to 80 inches; mottled grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/4) clay; moderate medium angular blocky structure; very firm, sticky and plastic; common black concretions; common concretions of calcium carbonate up to 25 mm in diameter; moderately alkaline.

Solum thickness ranges from 60 to more than 80 inches.

The A horizon is dark grayish brown, pale brown, dark brown, light yellowish brown, or yellowish brown. It is slightly acid to very strongly acid.

The B21t horizon is red, dark red, or yellowish red. It is mottled in shades of brown, red, yellow, or gray. It is clay or clay loam. Reaction is strongly acid or medium acid.

The B22t horizon is mottled in shades of red, yellow, and gray. It is clay or clay loam. Reaction is strongly acid or medium acid.

The B23t horizon is gray or light brownish gray with mottles in shades of red, yellow, or brown. It is clay or clay loam. Reaction is strongly acid or medium acid.

The B24t horizon is yellowish brown, light brownish gray, or gray with mottles in shades of gray, yellow, and red. It is clay or clay loam. Reaction is medium acid or slightly acid.

The B25t horizon is mottled gray, grayish brown, light brownish gray, yellowish brown, light olive brown, and olive yellow. Many pedons have masses of calcium carbonate.

Arol series

The Arol series consists of moderately deep loamy soils on erosional uplands. These soils formed in interbedded clay, tuff, ash beds, and sandstone. Slopes are 0 to 3 percent.

Typical pedon of Arol fine sandy loam, 1 to 3 percent slopes; from the intersection of U.S. Highway 75 and Texas Highway 30 at the courthouse in Huntsville, 1.3 miles west on Texas Highway 30, 4.6 miles north on the west service road of Interstate Highway 45, 2.7 miles west on Wire Road, and 320 feet south in pasture:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam; massive; hard, friable; many fine roots; medium acid; abrupt smooth boundary.

B21tg—6 to 18 inches; black (10YR 2/1) clay; moderate medium blocky structure; very hard, very firm, sticky and plastic; common fine roots; thin patchy clay films on faces of peds; few shiny pressure faces; medium acid; gradual wavy boundary.

B22tg—18 to 30 inches; very dark gray (10YR 3/1) clay; moderate coarse blocky structure; very hard, very firm, sticky and plastic; common fine roots; thin patchy clay films on faces of peds; few shiny pressure faces; slightly acid; abrupt smooth boundary.

Cr—30 to 45 inches; pale olive (5Y 6/3) clayey tuff; massive and weakly bedded; extremely hard, extremely firm; can be cut with a spade; gray stains between cleavage planes; neutral.

Solum thickness ranges from 20 to 40 inches.

The A horizon is dark grayish brown, grayish brown, light brownish gray, dark gray, or gray. Some pedons have an A2g horizon that is one or two units of value higher than the A1 horizon. Texture is loam or fine sandy loam. Reaction is medium acid or strongly acid.

The B2tg horizon is clay or clay loam. The clay content ranges from 35 to 50 percent.

The B21tg horizon is black, very dark gray, very dark grayish brown, or dark brown. Reaction ranges from neutral to strongly acid.

The B22tg horizon is black, very dark gray, dark gray, gray, dark grayish brown, grayish brown, or dark brown. Reaction ranges from medium acid to mildly alkaline.

Some pedons have a B3 horizon that ranges from slightly acid to moderately alkaline.

The Cr horizon ranges from clayey tuff to clay or tuffaceous friable sand containing small amounts of volcanic materials to very fine grained weakly consolidated sandstone. It is pale olive, light olive gray, olive, light gray, light brownish gray, or brown. Reaction ranges from medium acid to moderately alkaline. Roots seldom enter the Cr horizon but extend along cleavage planes in a few places.

Arriola series

The Arriola series consists of moderately deep loamy soils on erosional uplands. These soils formed in tuffaceous clay, siltstone, and sandstone. Slopes are 1 to 5 percent.

Typical pedon of Arriola fine sandy loam, 1 to 5 percent slopes; from the intersection of U.S. Highway 75 and Texas Highway 30 at the courthouse in Huntsville, 1.3 miles west on Texas Highway 30, 16.1 miles north on Interstate Highway 45, 0.8 mile east on Farm Road 2989, and 40 feet north in pine timber:

A1—0 to 4 inches; pale brown (10YR 6/3) fine sandy loam; weak fine granular structure; slightly hard, friable; many fine, medium, and coarse roots; many fine pores; slightly acid; clear smooth boundary.

A2—4 to 9 inches; light yellowish brown (10YR 6/4) fine sandy loam; single grained; slightly hard, friable; many fine, medium, and coarse roots; many fine pores; few rounded siliceous pebbles up to 1-1/4 inches in diameter that are concentrated on top of Bt horizon; strongly acid; abrupt wavy boundary.

B21t—9 to 16 inches; dark red (2.5YR 3/6) clay with common medium distinct brown (7.5YR 4/2) mottles; moderate fine subangular blocky structure; extremely hard, very firm, sticky and plastic; common medium and coarse roots; few fine pores; thin patchy clay films on the faces of peds; very strongly acid; clear wavy boundary.

B22t—16 to 23 inches; mottled red (2.5YR 4/8) and dark reddish gray (5YR 4/2) clay; moderate coarse angular blocky structure; extremely hard, very firm, sticky and plastic; common medium and coarse roots; few fine pores; thin patchy clay films on the faces of peds; very strongly acid; clear wavy boundary.

B23t—23 to 38 inches; brown (7.5YR 4/2) clay with common medium prominent dark red (2.5YR 3/6) mottles; moderate coarse blocky structure; extremely hard, very firm, sticky and plastic; few fine and medium roots that are mainly along the faces of peds; few fragments of siltstone are scattered throughout the upper part of the horizon but range to common in the lower part; very strongly acid; abrupt wavy boundary.

Cr—38 to 50 inches; light brownish gray (2.5Y 6/2) siltstone containing strata of mottled grayish brown and strong brown clay 1/4 to 1/2 inch thick; interstices in the upper 6 inches are filled with dark reddish brown clay; massive; very hard when dry and easily crushed when moist; few fine roots are in the clayey pockets.

The solum is 20 to 40 inches thick over a paralithic contact with siltstone or sandstone.

The A horizon is very dark grayish brown, dark brown, dark gray, gray, dark grayish brown, grayish brown, brown, yellowish brown, light yellowish brown, pale brown, or light brownish gray. The A1 horizon is strongly acid to slightly acid. The A2 horizon is very strongly acid to medium acid.

The B21t horizon is dark red, red, or dark reddish brown. Mottles range from common to many; they are reddish brown, reddish gray, brown, grayish brown, or gray. Some pedons lack mottles in the B21t horizon.

The B22t horizon is mottled red, dark red, reddish brown, reddish gray, strong brown, or dark gray.

The B23t horizon is reddish gray, brown, dark grayish brown, gray, or grayish brown. It has mottles in shades of red, dark red, or strong brown.

The Bt horizon is very strongly acid or strongly acid.

The Cr horizon is gray tuffaceous siltstone, sandstone, or interbedded sandstone and siltstone.

Conroe series

The Conroe series consists of deep sandy upland soils. These soils formed in unconsolidated acid sandy clays and sands. Slopes are 1 to 5 percent.

Typical pedon of Conroe loamy fine sand in an area of Conroe association, gently undulating; from the intersection of U.S. Highway 75 and Texas Highway 150 in New Waverly, 7.0 miles east on Texas Highway 150, 0.35 mile south on Farm Road 1097, and 100 feet east of road in pine timber:

A1—0 to 5 inches; grayish brown (10YR 5/2) loamy fine sand; massive; very friable; many coarse roots; common ironstone nodules up to 20 mm in diameter; slightly acid; clear smooth boundary.

A2—5 to 28 inches; light yellowish brown (10YR 6/4) loamy fine sand; massive; very friable; common coarse roots; common ironstone nodules up to 20 mm in diameter; medium acid; clear smooth boundary.

B21t—28 to 33 inches; yellowish brown (10YR 5/4) sandy clay loam; common medium prominent red (10YR 4/8) mottles; moderate medium blocky structure; firm; common coarse roots; common fine pores; common ironstone nodules up to 20 mm in diameter; strongly acid; clear smooth boundary.

B22t—33 to 70 inches; prominently and coarsely mottled dark red (10R 3/6), light gray (10YR 7/1), and strong brown (7.5YR 5/8) clay; moderate medium blocky structure; very hard, firm, sticky and plastic; about 40 percent plinthite by volume; common coarse roots in the gray matrix only; few rounded pebbles; few ironstone nodules up to 15 mm in diameter; strongly acid.

Solum thickness ranges from 60 to more than 100 inches.

The A1 horizon is dark gray, gray, or grayish brown. It is slightly acid to strongly acid.

The A2 horizon is pale brown, light yellowish brown, or light gray. It is medium acid to very strongly acid.

The B21t horizon is light yellowish brown or yellowish brown with red mottles. It is sandy clay loam, sandy clay, or clay loam. Reaction is strongly acid or very strongly acid.

The B22t horizon is prominently and coarsely mottled in shades of red, gray, and brown. It is sandy clay or clay. Reaction is strongly acid or very strongly acid. The content of plinthite ranges from 30 to 50 percent by volume.

Depcor series

The Depcor series consists of deep sandy upland soils. These soils formed in thick beds of loamy unconsolidated sediments. Slopes are 1 to 10 percent.

Typical pedon of Depcor loamy fine sand in an area of Depcor-Huntsburg association, gently undulating; from the intersection of U.S. Highway 75 and Farm Road 1374 in Huntsville, 1.5 miles south on Farm Road 1374 and 200 feet west of road in pine timber:

A1—0 to 5 inches; brown (10YR 5/3) loamy fine sand; weak fine granular structure; loose, very friable; many coarse roots; very strongly acid; clear smooth boundary.

A2—5 to 26 inches; light yellowish brown (10YR 6/4) loamy fine sand; single grained; loose, very friable; few ironstone nodules 5 to 15 mm in diameter; many coarse roots; very strongly acid; clear smooth boundary.

B21t—26 to 32 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium prominent red (10R 4/6) mottles; moderate medium subangular blocky structure; hard, firm; many coarse roots; common fine pores; very strongly acid; clear smooth boundary.

B22t—32 to 44 inches; mottled yellowish brown (10YR 5/6), dark red (10R 3/6) and light brownish gray (10YR 6/2) sandy clay loam; moderate medium subangular blocky structure; hard, firm; thick continous clay films on faces of peds; 20 percent plinthite by volume; many coarse roots; very strongly acid; clear smooth boundary.

B23t—44 to 65 inches; mottled red (10R 4/8), strong brown (7.5YR 5/8) and light brownish gray (10YR 6/2) sandy clay loam; moderate coarse blocky structure; hard, firm; thick clay films and flows along the faces of peds; 15 percent plinthite by volume; few coarse roots; few fine pores; very strongly acid; gradual boundary.

C—65 to 80 inches; red (10R 4/8) sandy clay loam; few medium prominent yellowish brown (10YR 5/8) mottles; massive; hard, firm; few gray clay films and flows along fracture planes; few strata of yellowish brown sand; very strongly acid.

Solum thickness ranges from 60 to 80 inches. Depth to a horizon that is 5 to 25 percent plinthite ranges from 25 to 40 inches. A few ironstone nodules occur in most pedons.

The A horizon is dark grayish brown, grayish brown, brown, or pale brown.

The A2 horizon is light yellowish brown, pale brown, or very pale brown. In some pedons the lower part of this horizon contains dark brown mottles.

The A horizon ranges from slightly acid to very strongly acid.

The B21t horizon is yellowish brown, dark yellowish brown, or brownish yellow. Mottles in shades of red and brown are few to common. Texture is sandy clay loam or clay loam. Reaction ranges from medium acid to very strongly acid.

The B22t and B23t horizons are mottled red, light red, dark red, yellowish red, reddish yellow, yellowish brown, reddish brown, strong brown, light brownish gray, light gray, and gray. They range from sandy clay loam to clay loam. Reaction ranges from slightly acid to very strongly acid.

The C horizon is red, yellowish red, strong brown, or brown and in many pedons is mottled in shades of red, yellow, gray, and brown. It is fine sandy loam, sandy clay loam, or sandy clay and is stratified in many pedons. Reaction ranges from medium acid to very strongly acid.

Elmina series

The Elmina series consists of deep sandy upland soils. These soils formed in sandy and clayey deposits containing volcanic materials. Slopes are 1 to 8 percent.

Typical pedon of Elmina loamy fine sand in an area of Elmina association, gently undulating; from the intersection of U.S. Highway 75 and Texas Highway 30 at the courthouse in Huntsville, 10.0 miles west on Texas Highway 30, 3.9 miles north on Farm Road 2550, 0.5 mile northeast on county road, and 20 feet north of road in pine timber:

A1—0 to 4 inches; light brownish gray (10YR 6/2) loamy fine sand; single grained; soft, very friable; many fine to coarse roots; strongly acid; clear smooth boundary.

A21—4 to 20 inches; very pale brown (10YR 7/3) loamy fine sand; single grained; soft, very friable; common medium and coarse roots; common fine pores; strongly acid; clear wavy boundary.

A22—20 to 32 inches; very pale brown (10YR 7/3) loamy fine sand; few medium distinct yellowish brown (10YR 5/8) mottles; single grained; soft, very friable; common medium and coarse roots; common fine pores; few fine siliceous pebbles; strongly acid; abrupt wavy boundary.

B21t—32 to 40 inches; grayish brown (10YR 5/2) clay; common medium prominent red (10R 4/8) and distinct yellowish brown (10YR 5/8) mottles; moderate medium angular blocky structure; very hard, very firm, very sticky and very plastic; few medium and coarse roots; few fine pores; few fine siliceous pebbles; very strongly acid; clear smooth boundary.

B22t—40 to 52 inches; light brownish gray (10YR 6/2) clay; common medium prominent dark red (10R 3/6) and few fine distinct yellowish brown mottles; moderate coarse blocky structure; very hard, very firm, very sticky and very plastic; few medium and coarse

roots; few fine pores; very strongly acid; clear smooth boundary.
Cr—52 to 60 inches; weakly to strongly cemented gray sandstone.

The solum ranges from 40 to 60 inches thick.

The A1 horizon is very dark grayish brown, dark grayish brown, brown, light brownish gray, or pale brown.

The A2 horizon is brown, pale brown, light yellowish brown, or very pale brown. Mottles, where present, are faint to distinct in shades of brown and yellow.

Reaction ranges from slightly acid to very strongly acid in the A horizon.

The B21t horizon is dark grayish brown, gray, grayish brown, light gray, or light brownish gray. Mottles are yellow, brown, strong brown, reddish brown, or red. The B21t horizon is clay or sandy clay.

The B22t horizon is dark grayish brown, gray, grayish brown, light gray, or light brownish gray, with mottles of red, brown, or yellow. It is clay or sandy clay.

The B2t horizon ranges from medium acid to extremely acid. Some pedons have a few siliceous pebbles.

Elysian variant

The Elysian variant consists of deep loamy soils on convex terraces. These soils formed in loamy sediments of fairly recent marine origin. Slopes are 1 to 4 percent.

Typical pedon of Elysian Variant fine sandy loam in an area of Kaman-Elysian Variant complex, 0 to 2 percent slopes; from the intersection of Texas Highway 30 and Farm Road 247 in Huntsville, 2.2 miles north on Farm Road 247, 8.3 miles northeast on Farm Road 980, 3.5 miles north on county road, 1.7 miles north on private ranch road, and 50 feet east in pasture:

A11—0 to 17 inches; brown (10YR 4/3) fine sandy loam; weak granular structure; hard, friable; many fine roots; slightly acid; clear smooth boundary.
A12—17 to 29 inches; light yellowish brown (10YR 6/4) fine sandy loam; massive; hard, friable; common fine roots; slightly acid; clear smooth boundary.
B21t—29 to 36 inches; yellowish brown (10YR 5/6) sandy clay loam; few medium red (2.5YR 5/8) mottles in the lower part; weak fine and medium subangular blocky structure; very hard, friable; common fine roots; few fine pockets and streaks of uncoated sand grains; medium acid; clear smooth boundary.
B22t—36 to 66 inches; mottled red (2.5YR 4/8) and yellowish brown (10YR 5/4) clay; few medium grayish brown (10YR 5/2) mottles; moderate fine and medium subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; few fine pockets and streaks of uncoated sand grains; strongly acid; clear smooth boundary.
C—66 to 80 inches; light brownish gray (10YR 6/2) loamy sand and thin bands of more clayey material that is mottled strong brown and yellowish red; massive; very friable; slightly acid.

The solum thickness exceeds 60 inches.

The A11 horizon is dark brown, brown, or dark grayish brown. It is slightly acid to strongly acid.

The A12 horizon is light yellowish brown, brown, grayish brown, or dark grayish brown. It is strongly acid to slightly acid.

The B21t horizon is yellowish brown, brown, or strong brown with mottles in shades of yellow, gray, and red. It is clay or clay loam that is strongly acid to slightly acid.

The B22t horizon is mottled in shades of gray, red and brown. It is slightly acid to strongly acid.

The C horizon is loamy sand, clay, or clay loam stratified with sand. Colors vary widely. Reaction is slightly acid or neutral.

Falba series

The Falba series consists of moderately deep loamy soils on erosional uplands. These soils formed in interbedded clay, tuff, ash beds, and sandstone. Slopes are 0 to 8 percent.

Typical pedon of Falba fine sandy loam, 1 to 5 percent slopes; from the intersection of Texas Highway 30 and Interstate Highway 45 in Huntsville, 7.7 miles west on Texas Highway 30, 4.5 miles north on Farm Road 2550, 1.3 miles west on Farm Road 1696, 1.4 miles south on Roberts Road, and 1,056 feet west in pasture:

Ap—0 to 5 inches; brown (10YR 5/3) fine sandy loam; few fine distinct yellowish brown mottles; weak platy structure; hard, very friable; common fine roots; strongly acid; abrupt smooth boundary.
A2g—5 to 7 inches; grayish brown (10YR 5/2) fine sandy loam; common fine distinct yellowish brown mottles; massive; hard, very friable; few fine roots; amplitude of the contact between the A2g and the B21tg horizon is about 5 inches for a horizontal distance of 2 feet; very strongly acid; abrupt wavy boundary.
B21tg—7 to 17 inches; grayish brown (10YR 5/2) clay; common fine and medium distinct yellowish brown (10YR 5/6) mottles; few fine prominent strong brown and yellowish red mottles; weak coarse prismatic structure parting to moderate medium and fine angular blocky; extremely hard, very firm, very sticky and very plastic; few fine roots, some of which are concentrated between the prisms; few shiny pressure faces on the peds; very strongly acid; gradual wavy boundary.
B22tg—17 to 24 inches; grayish brown (10YR 5/2) on the outside of the peds and grayish brown (2.5YR 5/2) on the inside of the peds; clay; weak coarse prismatic structure parting to moderate medium and coarse blocky; extremely hard, very firm, very sticky

and very plastic; few strongly cemented black nodules surrounded by medium distinct strong brown (7.5YR 5/6) mottles; few fine roots between prisms; few very fine sand pockets about 1 cm in diameter between some peds; common white powdery masses about 1 to 5 mm; few shiny pressure faces; very strongly acid; clear wavy boundary.

B23tg & Cr—24 to 33 inches; light brownish gray (2.5Y 6/2) sandy clay loam; few medium prominent strong brown (7.5YR 5/6) mottles; weak coarse and medium blocky structure; very hard, very firm; the B23tg part consists of dark gray (10YR 4/1) clay flows or thick continuous clay films between the blocks; few lenses of loam; few brittle tuffaceous sandstone fragments from 1 to 10 cm across the long axis; few fine roots; few strongly cemented iron concretions up to 1.5 cm in diameter; few soft white masses; very strongly acid; abrupt wavy boundary.

Cr—33 to 55 inches; very pale brown (10YR 7/3) tuffaceous fine sandstone with angular fractures; weakly cemented; few fine roots along fractures in thin clay flows; few medium strongly cemented black concretions; few soft red and yellow masses; very strongly acid.

Depth to tuffaceous sandstone, siltstone, or tuffaceous clays ranges from 20 to 40 inches.

The Ap horizon is brown, dark grayish brown, grayish brown, light brownish gray, dark gray, or gray. The color of the A2g horizon, where present, is one or two units of value higher than the Ap horizon. Mottles in the A horizon range from few to common but are absent in many pedons. Reaction is medium acid or strongly acid in the A horizon.

The Btg horizon is dark gray, gray, dark grayish brown, grayish brown, or light brownish gray. Mottles are few to common, fine to medium, and in shades of brown and red. Texture is clay or clay loam. Reaction is strongly acid or very strongly acid.

The Cr horizon is pale olive, light olive gray, olive gray, light gray, gray, light brownish gray, or pale brown. It is clayey tuff, tuffaceous clay, volcanic ash, fine grained sandstone, or siltstone.

Ferris series

The Ferris series consists of deep clayey upland soils. These soils formed in weakly consolidated, calcareous marine sediments high in montmorillonitic clay. Slopes are 1 to 8 percent.

Typical pedon of Ferris clay, 1 to 5 percent slopes; from the intersection of U.S. Highway 75 and U.S. Highway 190 at the courthouse in Huntsville, 4.1 miles east on U.S. Highway 190, 1,700 feet north on oil field road, and 1,000 feet east in pasture at the center of a microdepression:

Ap—0 to 6 inches; dark gray (10YR 4/1) clay; fine subangular blocky structure; hard, firm, sticky and plastic; many fine roots; common fine concretions of calcium carbonate; moderately alkaline; clear smooth boundary.

AC1—6 to 31 inches; light gray (2.5Y 7/2) clay; few fine distinct brownish yellow mottles; strong fine subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; clay films on faces of peds; common concretions of calcium carbonate up to 10 mm in diameter; soft masses of calcium carbonate; cracks are filled with dark gray material; moderately alkaline; gradual wavy boundary.

AC2—31 to 47 inches; light gray (2.5Y 7/2) clay; common medium distinct reddish yellow (7.5YR 6/6) mottles; strong fine subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; grayish brown clay films on faces of peds; very evident slickensides; many concretions of calcium carbonate up to 20 mm in diameter; cracks filled with dark gray material extend to 45 inches; moderately alkaline; gradual wavy boundary.

C—47 to 70 inches; light gray (5Y 7/2) clay; common medium distinct brownish yellow (10YR 6/6) mottles; strong coarse blocky structure; very hard, firm, sticky and plastic; common concretions of calcium carbonate up to 2 inches in diameter; slickensides are evident; some intersect; moderately alkaline.

Solum thickness ranges from 30 to more than 60 inches. Cracks extend to more than 20 inches in depth.

The A horizon is dark grayish brown, very dark grayish brown, or dark gray. The AC and C horizons are light gray, light brownish gray, light olive gray, or olive gray. Soft masses of calcium carbonate range from few to many. Some pedons have few siliceous pebbles.

Galilee series

The Galilee series consists of moderately deep loamy soils on erosional uplands. These soils formed in clayey shale, shaly clay, siltstone, and sandstone. Slopes are 5 to 16 percent.

Typical pedon of Galilee fine sandy loam in an area of Galilee-Gomery association, rolling; from the intersection of Texas Highway 19 and Farm Road 247 in Huntsville, 10.6 miles north-northwest on Farm Road 247, 3.1 miles east on private road, 2.0 miles north on logging trail, and 1,000 feet northwest in woods:

A1—0 to 8 inches; grayish brown (10YR 5/2) fine sandy loam; weak subangular blocky structure; hard, friable; many fine, medium, and coarse roots; common fine pores; slightly acid; clear smooth boundary.

B21t—8 to 19 inches; yellowish red (5YR 4/6) clay; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; common fine, medium,

and coarse roots; few fine pores; thick continuous dark clay films on faces of peds; very strongly acid; gradual wavy boundary.

B22t—19 to 26 inches; reddish brown (5YR 4/4) clay; moderate medium and coarse blocky structure; very hard, firm, sticky and plastic; few fine, medium, and coarse roots; few fine pores; thin continuous clay films on faces of peds; very strongly acid; gradual wavy boundary.

B23t—26 to 32 inches; reddish brown (5YR 5/4) sandy clay loam; moderate coarse blocky structure; hard, firm, slightly sticky and slightly plastic; few medium and coarse roots; common fine pores; thin continuous clay films; very strongly acid; gradual wavy boundary.

B3—32 to 38 inches; mottled yellowish red (5YR 4/6) and brown (7.5YR 5/4) sandy clay loam; moderate coarse blocky structure; hard, firm, slightly sticky and slightly plastic; few medium and coarse roots; common fine pores; peds have thin continuous clay films of slightly darker color; very strongly acid; abrupt smooth boundary.

Cr—38 to 50 inches; stratified, weakly cemented sandstone interbedded with mottled reddish brown (5YR 5/4) and brown (7.5YR 4/4, 5/2) fine sandy loam; sandstone can be cut with spade; very strongly acid.

The solum is 20 to 40 inches thick over a paralithic contact with weakly or strongly cemented sandstone, clayey shale, or siltstone.

The A horizon is very dark grayish brown, dark grayish brown, very dark brown, pale brown, or grayish brown. It is slightly acid to very strongly acid.

The B21t and B22t horizons are reddish brown, yellowish red, strong brown, brown, or red. The B22t horizon in some pedons contains red, yellowish red, reddish yellow, brownish yellow, or pale brown mottles. The B21t and B22t horizons are clay or clay loam. Reaction ranges from medium acid to very strongly acid.

The B23t and B3 horizons are reddish brown to strong brown. In some pedons they are mottled in shades of red, brown, or yellow. The texture ranges from sandy clay loam to clay. Reaction ranges from medium acid to very strongly acid.

The C horizon ranges from weakly cemented to strongly cemented sandstone, clayey shale, or shaly clay with platy rock structure.

Gladewater series

The Gladewater series consists of moderately deep clayey soils on flood plains. These soils formed in recent slightly acid clayey sediments. Slopes are from 0 to 1 percent.

Typical pedon of Gladewater clay, frequently flooded; from the intersection of Texas Highway 150 and Farm Road 1375 in New Waverly, 5.3 miles northeast on Farm Road 1375, 3.4 miles southeast on county road into Winter's Bayou bottom, and 50 feet south in pasture:

A1—0 to 6 inches; grayish brown (10YR 5/2) clay; common medium distinct dark brown (7.5YR 4/4) mottles; moderate fine subangular blocky structure; very hard, very firm, sticky and plastic; many fine roots; slightly acid; clear smooth boundary.

B21g—6 to 25 inches; grayish brown (2.5Y 5/2) clay; common medium distinct strong brown (7.5YR 5/8) mottles; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; medium acid; clear smooth boundary.

B22g—25 to 35 inches; gray (10YR 5/1) clay; common medium distinct strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; mildly alkaline; clear smooth boundary.

Cg—35 to 65 inches; dark gray (10YR 4/1) clay; common medium distinct yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles; massive; very hard, very firm, sticky and plastic; few soft 2 to 5 mm black concretions; neutral.

The A horizon is black, very dark grayish brown, dark gray, and grayish brown. In places it is mottled with dark brown, very dark brown, or reddish brown. Reaction is slightly acid or medium acid.

The Bg horizon is gray, grayish brown, or light brownish gray. It is mottled in shades of brown, red, and yellow. Reaction ranges from very strongly acid to neutral.

The Cg horizon is dark gray or gray. It is mottled in shades of brown, yellow, red, and olive. Reaction is slightly acid or neutral.

Gomery series

The Gomery series consists of deep sandy upland soils. These soils formed in beds of clay and shaly sandstone. Slopes are 1 to 16 percent.

Typical pedon of Gomery loamy fine sand in an area of Gomery association, undulating; from the intersection of the Walker-Trinity county line and Farm Road 1893, 0.3 mile west on Farm Road 1893 and 60 feet northwest of road in a loblolly pine plantation:

A1—0 to 5 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak granular structure; soft, very friable; many fine, medium, and coarse roots; few rounded siliceous pebbles 2 to 15 mm in diameter; slightly acid; clear smooth boundary.

A21—5 to 18 inches; pale brown (10YR 6/3) loamy fine sand; single grained; loose; very friable; many fine, medium, and coarse roots; few rounded siliceous

pebbles 2 to 15 mm in diameter; slightly acid; clear smooth boundary.

A22—18 to 26 inches; light yellowish brown (10YR 6/4) loamy fine sand; common medium strong brown (7.5YR 5/6) mottles; single grained; slightly hard, very friable; many fine, medium, and coarse roots; few rounded siliceous pebbles 2 to 25 mm in diameter; slightly acid; clear smooth boundary.

B21t—26 to 31 inches; mottled grayish brown (10YR 5/2), red (10R 4/8), and yellowish brown (10YR 5/4) sandy clay loam; moderate fine subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; common fine roots; many medium and coarse roots; common fine pores; few black concretions 5 to 15 mm in diameter; few rounded siliceous pebbles 5 to 15 mm in diameter; strongly acid; clear smooth boundary.

B22t—31 to 47 inches; grayish brown (10YR 5/2) sandy clay loam; common medium prominent red (10R 4/6) mottles; moderate fine subangular blocky structure; very hard, friable, sticky and plastic; few fine roots; common fine pores; thick continuous brown (10YR 5/3) clay films on surface of peds; medium acid; clear smooth boundary.

B23t—47 to 54 inches; gray (10YR 5/1) sandy clay loam; common medium prominent red (2.5YR 4/6) mottles; moderate fine subangular blocky structure; very hard, friable, sticky and plastic; few fine roots; common fine pores; few light gray fragments of sandstone; medium acid; clear smooth boundary.

Cr—54 to 60 inches; strongly cemented gray sandstone.

Solum thickness ranges from 40 to 60 inches.

The A horizon is dark grayish brown, very dark grayish brown, grayish brown, or brown.

The A2 horizon is light brownish gray, very pale brown, brown, pale brown, or light yellowish brown.

The A horizon ranges from slightly acid to very strongly acid.

The B2t horizon is light brownish gray, grayish brown, dark grayish brown, dark gray, gray, or light gray with few to many yellowish brown, dark brown, yellowish red, and red mottles. The texture is sandy clay loam or clay loam, and ranges to sandy clay in the lower part of some pedons. Reaction ranges from medium acid to very strongly acid.

The Cr horizon ranges from stratified shaly clay and sandstone to weakly or strongly cemented sandstone.

Goreen series

The Goreen series consists of moderately deep loamy upland soils. These soils formed in shaly clay and sandstone. Slopes are 1 to 5 percent.

Typical pedon of Goreen fine sandy loam in an area of Rosenwall-Goreen association, gently undulating; from the intersection of the Walker-Trinity County line and Farm Road 230, 2.1 miles west on Farm Road 230, 4.1 miles north on Chalk Cemetery Road, and 75 feet east in pine timber:

A—0 to 13 inches; grayish brown (10YR 5/2) fine sandy loam; moderate fine subangular blocky structure; hard, friable; many medium and coarse roots; common fine pores; few siliceous pebbles 15 to 20 mm in diameter; very strongly acid; clear smooth boundary.

B21tg—13 to 26 inches; dark brown (7.5YR 4/2) clay; many medium prominent red (10R 4/8) mottles; moderate fine blocky structure; very hard, firm, sticky and plastic; many medium and coarse roots; few fine pores; thick clay films on the faces of peds; very strongly acid; clear smooth boundary.

B22tg—26 to 31 inches; dark brown (7.5YR 4/2) clay; common medium distinct yellowish red (5YR 4/6) mottles; moderate fine blocky structure; very hard, firm, sticky and plastic; many fine and medium roots; few fine pores; few fragments of weakly cemented sandstone scattered throughout the horizon; thick clay films on the faces of peds; very strongly acid; abrupt smooth boundary.

Cr—31 to 40 inches; weakly cemented sandstone interbedded with brown shaly clay; massive; hard; few fine roots in the clay-filled interstices; very strongly acid.

The solum ranges from 20 to 40 inches thick.

The A horizon is grayish brown, dark grayish brown, brown, or dark gray. In some pedons the A2 horizon is light brownish gray, grayish brown, or brown. Reaction ranges from slightly acid to very strongly acid.

The B21tg and B22tg horizons are dark brown, brown, light brownish gray, or grayish brown. Mottles in shades of red, yellowish red, strong brown, yellow, or gray range from few to many. Reaction ranges from strongly acid to extremely acid.

The Cr horizon is weakly to strongly cemented sandstone or siltstone interbedded with shaly clay.

Gowker series

The Gowker series consists of deep clayey soils on flood plains. These soils formed in loamy and clayey recent sediments. Slopes are 0 to 1 percent.

Typical pedon of Gowker clay loam in an area of Gowker and Kanebreak soils, frequently flooded; from the intersection of U.S. Highway 75 and Texas Highway 19 at the courthouse in Huntsville, 12.6 miles northeast on Texas Highway 19, 2.4 miles east on Wood Farm Road, and 125 feet south in pasture:

A11—0 to 9 inches; very dark gray (10YR 3/1) clay loam; moderate fine subangular blocky structure; hard, firm; many fine roots; common fine and

medium pores; few thin streaks and strata of dark brown clay loam; slightly acid; clear smooth boundary.

A12—9 to 30 inches; black (10YR 2/1) clay loam; moderate fine subangular blocky structure; hard, firm; common fine roots; common fine pores; few thin streaks and strata of dark brown clay loam; slightly acid; clear wavy boundary.

A13—30 to 34 inches; very dark gray (10YR 3/1) clay; moderate medium blocky structure; very hard, very firm, sticky and plastic; common fine roots; few fine pores; neutral; gradual wavy boundary.

C1—34 to 44 inches; dark gray (10YR 4/1) clay; common fine distinct brown mottles; massive; very hard, very firm, sticky and plastic; few fine roots; few fine pores; few 1 to 2 mm black concretions; slightly acid; gradual wavy boundary.

C2—44 to 60 inches; grayish brown (10YR 5/2) sandy clay loam; common fine distinct reddish brown mottles; massive; hard, firm, slightly sticky and plastic; few fine roots; few fine pores; few fine 1 to 2 mm black concretions; slightly acid.

The A11 and A12 horizons are black, very dark gray, very dark brown, very dark grayish brown, or dark brown. Reaction is slightly acid or medium acid.

The A13 horizon is black, very dark gray, dark gray, dark grayish brown, very dark grayish brown, or very dark brown. Some pedons are mottled brown, reddish brown, or strong brown. The texture is clay, sandy clay, clay loam, or sandy clay loam. Reaction ranges from neutral to medium acid.

The C horizon is light brownish gray, grayish brown, dark grayish brown, gray, dark gray, or brown. It is mottled brown, reddish brown, yellowish brown, or strong brown. The texture is clay, clay loam, sandy clay, or sandy clay loam. Some pedons are stratified with fine sandy loam or sand. Reaction ranges from medium acid to moderately alkaline.

Gunter series

The Gunter series consists of deep sandy upland soils. These soils formed in unconsolidated acid sandy clay loams and sands. Slopes are 1 to 8 percent.

Typical pedon of Gunter loamy sand in an area of Gunter association, undulating; from the intersection of U.S. Highway 75 and Texas Highway 30 at the courthouse in Huntsville, 3.9 miles west on Texas Highway 30, 10.5 miles southwest on Farm Road 1791, 0.3 mile north on Farm Road 3179, 5.3 miles west on Poor Road, 2.0 miles northwest on Woods Road, and 50 feet east in pine timber:

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loamy sand; weak granular; loose, very friable; many coarse roots; strongly acid; clear smooth boundary.

A21—4 to 30 inches; pale brown (10YR 6/3) loamy sand; single grained; soft, very friable; many coarse roots; few ironstone nodules up to 15 mm in diameter; slightly acid; clear wavy boundary.

A22—30 to 48 inches; very pale brown (10YR 7/3) loamy sand; common medium distinct strong brown (7.5YR 5/6) mottles that are slightly harder than the surrounding mass; single grained; soft, very friable; scattered throughout the horizon are spheroidal areas of dark brown (7.5YR 4/4) loam material 6 inches long and 2 inches thick; few ironstone nodules up to 25 mm in diameter; slightly acid; clear wavy boundary.

B1—48 to 60 inches; mottled yellowish brown (10YR 5/8), light gray (10YR 7/2), red (2.5YR 4/6), and yellowish red (5YR 4/6) sandy loam; massive; very hard, friable; common roots; the red mottles are plinthite; few rounded ironstone nodules 1 to 2 inches in diameter; very strongly acid; clear smooth boundary.

B2t—60 to 75 inches; mottled dark red (10R 3/6) and white (2.5Y 8/2) sandy clay loam; moderate coarse blocky structure; very hard, firm; few roots that are in the white part only; 10 percent to 50 percent plinthite; very strongly acid.

Solum thickness ranges from 60 to more than 100 inches.

The A1 horizon is light brownish gray, grayish brown, or dark grayish brown. It is slightly acid to very stongly acid.

The A21 and A22 horizons are very pale brown, pale brown, light yellowish brown, or yellowish brown. They have few to common red or yellowish red mottles of more loamy material, which in some pedons are lamellae. Reaction ranges from slightly acid to very strongly acid.

The B1 horizon is mottled yellowish brown, gray, red, or light yellowish brown. It is loamy fine sand, sandy loam, or fine sandy loam. Reaction ranges from medium acid to very strongly acid.

The B2t horizon is mottled red, gray, reddish brown, strong brown, or yellowish brown. It is sandy loam or sandy clay loam. Reaction is strongly acid or very strongly acid.

Houston Black series

The Houston Black series consists of deep clayey upland soils. These soils formed in calcareous clay and marl. Slopes are 1 to 3 percent.

Typical pedon of Houston Black clay, 1 to 3 percent slopes; from the intersection of Interstate Highway 45 and Texas Highway 30 in Huntsville, 0.8 mile west on Texas Highway 30, 0.6 mile south on private ranch road, and 50 feet east in pasture, at the center of a microdepression:

A11—0 to 6 inches; black (N 2/0) clay; moderate fine and medium blocky structure; very hard, very firm, very sticky and plastic; many fine roots; few fine concretions of calcium carbonate; shiny ped faces; moderately alkaline; clear wavy boundary.

A12—6 to 27 inches; black (N 2/0) clay; moderate fine angular blocky structure; very hard, very firm, very sticky and plastic; many fine roots; few fine concretions of calcium carbonate; common intersecting slickensides; moderately alkaline; gradual wavy boundary.

A13—27 to 45 inches; very dark gray (10YR 3/1) clay; moderate, medium blocky structure; very hard, very firm, sticky and plastic; common fine roots; many concretions of calcium carbonate; common intersecting slickensides; moderately alkaline; clear wavy boundary.

AC—45 to 65 inches; gray (10YR 5/1) clay; moderate medium blocky structure; very hard, very firm, very sticky and plastic; few fine roots; common concretions of calcium carbonate up to 10 mm in diameter; some soft, large masses of calcium carbonate; moderately alkaline.

Thickness of the combined A and AC horizons ranges from about 40 to more than 60 inches. Intersecting slickensides begin at a depth of about 16 to 24 inches. Cycles of microdepressions and microknolls are repeated each 12 to 19 feet.

The A horizon is black, very dark gray, dark gray, or gray.

The upper part of the AC horizon ranges from grayish brown to dark grayish brown in the microdepressions and from grayish brown to olive on the microknolls. The lower part of the AC horizon ranges from dark grayish brown to light brownish gray and has olive, brown, and yellow mottles or is olive to yellow with gray mottles. The lower horizon contains many soft masses of calcium carbonate.

Huntsburg series

The Huntsburg series consists of deep clayey upland soils. These soils formed in stratified clayey and loamy sediments of marine or fluvial origin. Slopes are 1 to 10 percent.

Typical pedon of Huntsburg loamy fine sand in an area of Depcor-Huntsburg association, gently undulating; from the intersection of U.S. Highway 75 and U.S. Highway 190 at the courthouse in Huntsville, 3.7 miles east on U.S. Highway 190, 4.2 miles south on Farm Road 2929, 4.75 miles south on Fournotch Road, 0.5 mile north on Forest Service Road 1375A, and 75 feet west of road in pine timber:

A1—0 to 6 inches; brown (10YR 5/3) loamy fine sand; weak fine granular structure; soft, very friable; many fine and medium roots; common coarse roots; common fine and medium pores; slightly acid; clear smooth boundry.

A2—6 to 14 inches; light yellowish brown (10YR 6/4) loamy fine sand; single grained; soft, very friable; many fine and medium roots, common coarse roots; common fine and medium pores; few nodules of ironstone 4 to 10 mm in diameter; medium acid; abrupt wavy boundary.

B21t—14 to 22 inches; yellowish brown (10YR 5/8) sandy clay; few fine prominent red mottles; moderate fine subangular blocky structure; very hard, firm; many medium and coarse roots; common fine pores; thin patchy clay films on faces of peds; few nodules of ironstone 4 to 10 mm in diameter; strongly acid; clear wavy boundary.

B22t—22 to 32 inches; mottled gray (10YR 6/1), dark red (2.5YR 3/6), and reddish yellow (7.5YR 6/8) clay; moderate fine subangular blocky structure; very hard, very firm; common fine and medium roots and few coarse roots; few fine pores; thin patchy clay films on faces of peds; about 20 percent plinthite and red mottles with hard centers; strongly acid; clear smooth boundary.

B23t—32 to 48 inches; light brownish gray (10YR 6/2) clay; many medium and coarse prominent red (10R 4/8) and few fine distinct reddish yellow mottles; moderate fine and medium subangular blocky structure; very hard, very firm; common fine and medium roots in the light brownish gray part; common fine pores; thin patchy clay films on faces of peds; 20 percent plinthite; the centers of a few of the red mottles have fine concretions; very strongly acid; clear smooth boundary.

B24t—48 to 61 inches; light gray (2.5Y 7/2) clay; common medium prominent dark red (10R 3/6) and common medium distinct reddish yellow (7.5YR 6/8) mottles; moderate fine subangular blocky structure; very hard, very firm; common fine and medium roots in the gray; few fine pores; thin patchy clay films on faces of peds; common fine and medium shiny faces and slickensides; very strongly acid; clear smooth boundary.

B25t—61 to 72 inches; light gray (2.5Y 7/2) clay; few fine prominent dark red and few fine distinct brownish yellow mottles; moderate fine subangular blocky structure; very hard, very firm; few fine and medium roots; few fine pores; thin patchy clay films on faces of peds; about 5 percent plinthite; common fine and medium shiny faces and slickensides; very strongly acid.

Solum thickness ranges from 60 to more than 100 inches.

The A1 horizon is very dark gray, very dark grayish brown, dark brown, brown, or grayish brown. The A2 horizon is brown, pale brown, very pale brown, light yel-

lowish brown, or light brown. Nodules of ironstone range from 0 to about 10 percent by volume. The A horizon is slightly acid or medium acid.

The Bt horizon is sandy clay or clay. It is strongly acid or very strongly acid. Nodules of ironstone and siliceous pebbles range from 0 to 15 percent by volume. The B21t horizon is yellowish brown, dark yellowish brown, or strong brown. Mottles of red, dark red, yellowish red, or brown are few to common. The B21t horizon between about 12 and 30 inches is 5 to about 25 percent plinthite.

The B22t horizon is reticulately mottled dark red, red, yellowish red, reddish yellow, strong brown, yellowish brown, gray, light gray, or light brownish gray.

The B23t, B24t, and B25t horizons are light gray, gray, or light brownish gray. Mottles are dark red, red, yellowish red, reddish yellow, strong brown, brownish yellow, or yellowish brown.

Kaman series

The Kaman series consists of deep clayey soils on flood plains. These soils formed in recent alkaline clayey sediments. Slopes are 0 to 2 percent.

Typical pedon of Kaman clay, occasionally flooded; from the intersection of Texas Highway 30 and Farm Road 247 in Huntsville, 2.2 miles north on Farm Road 247, 10.9 miles northeast on Farm Road 980, 2.2 miles north on Ellis State Prison Farm road into the Trinity River bottom, and 50 feet east in pasture:

A1—0 to 33 inches; black (10YR 2/1) clay; moderate fine and medium blocky structure; very hard, very firm, sticky and plastic; many fine roots; medium acid; clear smooth boundary.

B2g—33 to 65 inches; dark gray (10YR 4/1) clay; moderate fine and medium blocky structure; very hard, very firm, sticky and plastic; peds have pressure faces; slickensides that do not intersect; few black concretions; slightly acid.

The A horizon is very dark gray or black. The B2g horizon is dark gray or gray. The soil is medium acid to mildly alkaline.

Kanebreak series

The Kanebreak series consists of loamy soils on flood plains. These soils formed in recent loamy sediments. Slopes are 0 to 1 percent.

Typical pedon of Kanebreak fine sandy loam in an area of Kanebreak soils, frequently flooded; from the intersection of Texas Highway 30 and Farm Road 247 in Huntsville, 10.5 miles north on Farm Road 247, 0.15 mile east on county road to gate, 4.4 miles east on private road, 2.3 miles south on private road, and 75 feet west of road in pasture:

A11g—0 to 8 inches; very dark grayish brown (10YR 3/2) fine sandy loam; few fine distinct mottles; weak fine subangular blocky structure; hard, friable; many fine roots; common fine pores; medium acid; clear smooth boundary.

A12g—8 to 14 inches; very dark grayish brown (10YR 3/2) fine sandy loam; few fine distinct brown mottles; moderate fine subangular blocky structure; hard, friable; many fine roots; common fine pores; few fine black concretions; slightly acid; clear wavy boundary.

A13g—14 to 20 inches; very dark grayish brown (10YR 3/2) sandy clay loam; few medium prominent dark reddish brown (5YR 3/4) mottles; moderate medium subangular blocky structure; very hard, firm; common fine roots; few fine pores; few crayfish krotovinas; neutral; clear smooth boundary.

A14g—20 to 28 inches; very dark grayish brown (10YR 3/2) sandy clay loam; few fine distinct brown mottles; moderate fine subangular blocky structure; very hard, firm; few fine roots; few fine pores; few thin strata of very pale brown fine sandy loam; a few peds have very dark gray coatings; many peds are coated with brown fine sandy loam; few crayfish krotovinas; mildly alkaline; clear smooth boundary.

C1g—28 to 41 inches; grayish brown (10YR 5/2) fine sandy loam; massive; hard, friable; few fine roots; few fine pores; few fine black concretions; few thin strata of sandy clay loam; few crayfish krotovinas; moderately alkaline; clear smooth boundary.

C2g—41 to 70 inches; light brownish gray (10YR 6/2) very fine sandy loam; massive; very hard, friable; few fine roots; few fine pores; few fine black concretions; few thin clay and clay loam strata in the lower part; moderately alkaline.

The A11g and A12g horizons are very dark gray, black, very dark grayish brown, or dark brown. The A12g is mottled brown, dark brown, yellowish brown, or dark yellowish brown. Pedons with 6 to 12 inches of dark grayish brown to light gray recent overwash are common.

The A12g horizon is fine sandy loam, sandy clay loam, or clay loam. Reaction ranges from medium acid to neutral.

The A13g and A14g horizons are black, very dark gray, dark gray, grayish brown, dark grayish brown, or very dark grayish brown. Mottles of brown or dark reddish brown range from few to common. The A13g horizon is sandy clay or clay loam, and the A14g horizon is sandy clay loam, clay loam, loam, or fine sandy loam. Reaction ranges from slightly acid to mildly alkaline.

The Cg horizon is grayish brown, light brownish gray, dark grayish brown, very dark grayish brown, gray, black, pale brown, or light gray. It is fine sandy loam, sandy clay loam, clay loam, very fine sandy loam, or loam. Reaction ranges from slightly acid to moderately alkaline.

Kaufman series

The Kaufman series consists of deep clayey soils on flood plains. These soils formed in recent alkaline clayey sediments. Slopes are 0 to 1 percent.

Typical pedon of Kaufman clay in an area of Kaufman-Gowker complex, frequently flooded; from the intersection of Texas Highway 30 and Interstate Highway 45 in Huntsville, 1.8 miles south on Interstate Highway 45, 9.6 miles southwest on Farm Road 1374, 3.1 miles south on Stubblefield Lake Road, 0.3 mile west on Log Road, and 200 feet north to San Jacinto River bottom in hardwood timber:

A11—0 to 7 inches; black (10YR 2/1) clay; moderate coarse blocky structure; very firm, very sticky and plastic; many coarse roots; slightly acid; gradual boundary.

A12—7 to 30 inches; black (N 2/0) clay; moderate fine angular blocky structure; very firm, very sticky and plastic; common coarse roots; pressure faces on ped surfaces; slightly acid; clear smooth boundary.

ACIg—30 to 43 inches; very dark gray (10YR 3/1) clay; moderate medium angular blocky structure; very firm, very sticky and plastic; common coarse roots; common slickensides, some intersect; medium acid; clear smooth boundary.

AC2g—43 to 65 inches; dark gray (10YR 4/1) clay; few fine distinct brown mottles; moderate medium blocky structure; very firm, very sticky and plastic, common slickensides, some of which intersect; neutral.

The soil is medium acid to mildly alkaline. The A horizon is very dark gray or black. In some pedons this horizon has mottles of dark brown or dark reddish brown.

The ACg horizon is very dark gray, dark gray, or gray. Some pedons have mottles of strong brown, reddish yellow, brownish yellow, and olive. The lower part of the horizon may have soft masses of calcium carbonate.

Kershaw series

The Kershaw series consists of deep sandy upland soils. These soils formed in thick beds of acid sands. Slopes are 0 to 5 percent.

Typical pedon of Kershaw sand, 0 to 5 percent slopes; from the intersection of Texas Highway 30 and Farm Road 247 in Huntsville, 2.2 miles north on Farm Road 247, 8.3 miles northeast on Farm Road 980, 300 feet north on county road, and 200 feet west in pasture:

A1—0 to 6 inches; grayish brown (10YR 5/2) sand; single grained; loose; common roots; strongly acid; gradual wavy boundary.

C1—6 to 37 inches; very pale brown (10YR 8/3) sand; single grained; loose; many roots; strongly acid; gradual wavy boundary.

C2—37 to 68 inches; very pale brown (10YR 7/4) sand; single grained; loose; few rounded pebbles 2 inches in diameter; few roots; strongly acid; gradual wavy boundary.

C3—68 to 80 inches; very pale brown (10YR 7/4) sand; single grained; loose; very strongly acid.

Solum thickness ranges from 80 to more than 100 inches.

The A1 horizon is dark grayish brown or grayish brown. It is medium acid to very strongly acid.

The C horizon is very pale brown or pale brown. Some pedons have light gray mottles below a depth of 40 inches. Reaction ranges from medium acid to very strongly acid.

Kitterll series

The Kitterll series consists of very shallow loamy soils on erosional uplands. These soils formed in interbedded clay, tuff, ash beds, and sandstone. Slopes are 1 to 10 percent.

Typical pedon of Kitterll fine sandy loam in an area of Kitterll-Rock outcrop complex, 1 to 10 percent slopes; from the intersection of Texas Highway 19 and U.S. Highway 75 at the courthouse in Huntsville, 13.4 miles northeast on Texas Highway 19, 3.7 miles southeast on Farm Road 980, 0.3 mile north on private road, and 100 feet east in pasture:

A1—0 to 6 inches; grayish brown (10YR 5/2) fine sandy loam; massive; hard, friable; few fine roots; common fine pores; slightly acid; abrupt smooth boundary.

Cr—6 to 8 inches; gray strongly cemented tuffaceous sandstone; massive; hard; hardness of about 2.5 on Moh's scale.

Depth to tuffaceous sandstone ranges from 3 to 12 inches. The soils are slightly acid to strongly acid.

The A horizon is dark grayish brown, grayish brown, brown, pale brown, or light brownish gray.

The Cr horizon is gray, strongly to weakly cemented tuffaceous siltstone, mudstone, or sandstone.

Landman series

The Landman series consists of deep sandy soils on stream terraces. These soils formed in sandy and loamy alluvium. Slopes are 1 to 5 percent.

Typical pedon of Landman loamy fine sand in an area of Landman association, gently undulating; from the intersection of Interstate Highway 45 and Farm Road 1374 in Huntsville, 9.6 miles southeast on Farm Road 1374,

2.8 miles south on Stubblefield Lake Road, 1,300 feet west on Log Road, and 30 feet south in pine timber:

A1—0 to 7 inches; very dark grayish brown (10YR 3/2) loamy fine sand; weak fine granular structure; slightly hard, very friable; many medium and coarse roots; slightly acid; clear smooth boundary.

A21—7 to 23 inches; light yellowish brown (10YR 6/4) loamy fine sand; single grained; loose; many fine, medium, and coarse roots; few siliceous pebbles up to 1 inch in diameter; slightly acid; clear smooth boundary.

A22—23 to 43 inches; light yellowish brown (10YR 6/4) loamy fine sand; single grained; loose; common fine, medium, and coarse roots; few fine brown slightly hard to weakly cemented masses; few siliceous pebbles up to 1 inch in diameter; slightly acid; clear smooth boundary.

A23—43 to 74 inches; light yellowish brown (10YR 6/4) loamy fine sand; massive; friable; slightly brittle; few medium and coarse roots; few thin bands of dark brown (7.5YR 4/4) loamy material that are less than 1 1/2 inches thick, bands are wavy and continuous; few siliceous pebbles up to 1 inch in diameter; few black concretions 15 mm in diameter; slightly acid; clear smooth boundary.

B2t—74 to 80 inches; mottled grayish brown (10YR 5/2), yellowish brown (10YR 5/8), and red (2.5YR 4/8) sandy clay loam; weak medium subangular blocky structure; very hard, firm; few medium and coarse roots; common fine pores; 10 to 15 percent plinthite by volume; strongly acid; clear smooth boundary.

Solum thickness ranges from 80 to more than 100 inches. Depth to horizons that are more than 5 percent plinthite ranges from 60 to 80 inches.

The A1 horizon is very dark grayish brown, dark grayish brown, grayish brown, or light brownish gray. The A21 and A22 horizons are brown, pale brown, light brownish gray, light gray, very pale brown, light yellowish brown, or yellowish brown. The A22 horizon has few scattered bodies of brown loamy material throughout. The A23 horizon is light yellowish brown, pale brown, very pale brown, or light gray. In some pedons the A23 horizon contains continuous, wavy bands of loamy material that are less than 2 inches thick. The A horizon ranges from slightly acid to strongly acid.

The B2t horizon is mottled yellowish brown, strong brown, yellowish red, red, and light gray. In some pedons this horizon has a matrix color of light gray or light brownish gray with mottles in shades of brown and red. It is sandy clay loam or fine sandy loam. Few to common siliceous pebbles, ironstone nodules, or black concretions occur in some pedons.

Leson series

The Leson series consists of deep clayey upland soils. These soils formed in alkaline clay. Slopes are 0 to 3 percent.

Typical pedon of Leson clay, 0 to 3 percent slopes; from the intersection of U.S. Highway 75 and Texas Highway 150 in New Waverly, 0.2 mile east on Texas Highway 150, 0.3 mile south on city street and county road, and 800 feet west in pasture in a microdepression:

Ap—0 to 5 inches; black (10YR 2/1) clay; moderate fine and medium subangular blocky structure; very hard, firm, sticky and plastic; when dry, the surface has a thin white crust; many fine roots; many fine pores; neutral; clear smooth boundary.

A11—5 to 21 inches; black (10YR 2/1) clay; moderate fine and medium subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; few shiny surfaces on ped faces; slickensides are evident in the lower part; neutral; clear smooth boundary.

A12—21 to 30 inches; very dark gray (10YR 3/1) clay; few fine distinct light brownish gray mottles; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; common fine brown concretions; slickensides are evident; neutral; clear smooth boundary.

AC—30 to 60 inches; grayish brown (2.5Y 5/2) clay; common medium faint yellow (2.5Y 7/6) mottles; moderate coarse blocky structure; very hard, very firm, sticky and plastic; slickensides are evident; common concretions of calcium carbonate up to 20 mm in diameter; cracks are filled with very dark gray clay; few black concretions; moderately alkaline.

Thickness of the combined A and AC horizons ranges from 30 to 60 inches. When dry, the soil has cracks 0.4 to 4 inches wide at a depth of 20 inches. Intersecting slickensides begin at a depth of about 15 inches. The soil is clayey throughout. Cycles of microdepressions and microknolls are repeated at an average of about every 20 feet.

The A horizon is black or very dark gray. It is slightly acid to moderately alkaline.

The AC horizon is grayish brown, olive gray, or olive. It is mildly alkaline or moderately alkaline. It may have few to many soft masses of calcium carbonate.

Lufkin series

The Lufkin series consists of deep clayey soils on stream terraces. These soils formed in slightly acid to alkaline clayey sediments. Slopes are 0 to 1 percent.

Typical pedon of Lufkin fine sandy loam, 0 to 1 percent; from the intersection of Texas Highway 30 and Farm Road 247 in Huntsville, 2.2 miles north on Farm

Road 247, 11.25 miles northeast on Farm Road 980, 0.8 mile northwest on ranch road, and 50 feet east in pasture:

Ap—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam; massive; friable; many fine roots; few black concretions; few pebbles; slightly acid; clear smooth boundary.

A2—5 to 9 inches; light gray (10YR 7/2) fine sandy loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; many fine roots; few 5 to 10 mm pebbles; slightly acid; abrupt wavy boundary.

B21tg—9 to 26 inches; grayish brown (2.5Y 5/2) clay; common medium prominent dark red (10R 3/8) mottles; moderate coarse blocky structure; very firm, sticky and plastic; pressure faces on ped surfaces; common fine roots; few 1 mm black concretions; very strongly acid; clear smooth boundary.

B22tg—26 to 37 inches; gray (10YR 5/1) clay; few fine distinct dark yellowish brown (10YR 4/4) mottles; moderate coarse blocky structure; very firm, very sticky and plastic; clay films on surfaces of peds; few roots on the ped surface; few 1 mm black concretions; slightly acid; clear smooth boundary.

B3tg—37 to 55 inches; dark gray (10YR 4/1) clay; moderate medium angular blocky structure; very firm, very sticky and plastic; clay films on ped surfaces; few roots along the ped faces; few 1 mm black concretions, few white noncalcareous concretions; moderately alkaline; clear smooth boundary.

C1—55 to 63 inches; gray (10YR 5/1) clay; common medium distinct yellowish brown (10YR 5/4) mottles; massive; very firm; few concretions of calcium carbonate; few roots; moderately alkaline; clear smooth boundary.

C2—63 to 75 inches; grayish brown (2.5Y 5/2) clay; massive; very firm; common concretions of calcium carbonate up to 15 mm in diameter; common 1 mm black concretions; moderately alkaline.

Solum thickness ranges from 48 to 60 inches.

The A1 horizon is grayish brown, gray, or light brownish gray. It is slightly acid to strongly acid.

The A2 horizon is grayish brown, light brownish gray, gray, or light gray. It is fine sandy loam or loam. Reaction is medium acid or strongly acid.

The B2tg horizon is dark gray, gray, grayish brown, or light brownish gray. Mottles may be few to common in shades of brown, yellow, and red. Reaction ranges from slightly acid to strongly acid.

The Cg horizon is light brownish gray, grayish brown, gray, or light gray with some of the grays having an olive cast. Mottles are in shades of olive, red, and brown. Reaction ranges from slightly acid to mildly alkaline. Many pedons have soft masses of calcium carbonate.

Moten series

The Moten series consists of deep loamy upland soils. These soils formed in loamy deposits. Slopes are 0 to 2 percent.

Typical pedon of Moten fine sandy loam, 0 to 2 percent slopes; from the intersection of the Walker-Trinity County line and Farm Road 230, 7.2 miles west on Farm Road 230, 2.1 miles north on county road, 0.2 mile west on firelane road, and 30 feet south in timber:

A1—0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; hard, friable; many fine, medium, and coarse roots; medium acid; clear smooth boundary.

A2g—4 to 21 inches; grayish brown (10YR 5/2) fine sandy loam; massive; hard, friable; common fine, medium, and coarse roots; common fine pores; few crayfish burrows; strongly acid; abrupt smooth boundary.

IIB21tg—21 to 36 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium and coarse subangular blocky structure; hard, friable; few medium and coarse roots; common fine pores; few clay bridges between sand grains; common crayfish krotovinas that are filled with grayish brown fine sandy loam; the krotovina walls are coated with dark gray silt and clay; the lower ends of a few krotovinas have very dark gray clay cups; very strongly acid; gradual wavy boundary.

IIB22tg—36 to 46 inches; dark gray brown (10YR 4/2) sandy clay loam; moderate coarse subangular blocky structure; very hard, firm; few medium and coarse roots; few fine pores; thin patchy clay films on faces of peds; common crayfish krotovinas that are filled with grayish brown very fine sandy loam and contain pockets of uncoated sand grains; common krotovina terminals that contain very dark gray clay cups and coatings; slightly acid; clear wavy boundary.

IIB23t—46 to 75 inches; brown (10YR 4/3) clay; moderate fine and medium blocky structure; very hard, firm, sticky and plastic; few fine and medium roots; few fine pores; thick black (10YR 2/1) clay films coating the faces of peds; few soft white masses throughout the horizon; mildly alkaline.

The A horizon ranges from medium acid to very strongly acid. The A1 horizon is very dark grayish brown, dark grayish brown, grayish brown, or light brownish gray. Where the A1 horizon is very dark grayish brown, it is less than 4 inches thick. The A2g horizon is grayish brown, light brownish gray, or light gray. Some pedons have a few yellowish brown mottles.

The IIB21tg horizon is very dark gray, dark grayish brown, or grayish brown. It is fine sandy loam, very fine sandy loam, or loam. Reaction ranges from slightly acid

to strongly acid. Some pedons have a few yellowish brown or dark brown mottles.

The IIB22tg horizon is dark grayish brown, grayish brown, or light brownish gray. Some pedons have a few yellowish brown mottles. The texture is sandy clay loam, loam, or fine sandy loam. Reaction ranges from slightly acid to mildly alkaline.

The IIB23t horizon is light brownish gray, dark grayish brown, or brown. It ranges from clay or sandy clay loam to fine sandy loam. Reaction ranges from medium acid to mildly alkaline.

Nugent series

The Nugent series consists of deep sandy soils on flood plains. The soils formed in very recent sandy acid sediments. Slopes are 0 to 1 percent.

Typical pedon of Nugent loamy sand in an area of Nugent soils, frequently flooded; from the intersection of U.S. Highway 75 and Texas Highway 19 at the courthouse in Huntsville, 12.9 miles northeast on Texas Highway 19, 2.9 miles west on Wood Farm County Road, 1.3 miles northwest into Harmon Creek bottom, and 50 feet east in pasture:

A1—0 to 10 inches; brown (10YR 5/3) loamy sand; single grained; very friable; many fine roots; few grayish brown clay loam balls; slightly acid; clear smooth boundary.

C1—10 to 22 inches; pale brown (10YR 6/3) sand; single grained; loose; common fine roots; occasional fine bands and flecks of organic material; occasional small grayish brown clay loam balls; slightly acid; clear smooth boundary.

C2—22 to 75 inches; very pale brown (10YR 7/3) sand; single grained; loose; numerous fine bands, 1 to 10 mm thick, that are grayish brown sandy clay loam; flecks of organic matter throughout the horizon; few fine roots, none at 75 inches; a few pebbles less than 15 mm in diameter; slightly acid; clear smooth boundary.

C3—75 to 80 inches; very pale brown (10YR 7/3) sand; single grained; loose; a few small pebbles; slightly acid.

Soil thickness exceeds 80 inches. Reaction is slightly acid or medium acid throughout.

The A horizon is brown, grayish brown, or dark grayish brown. It is loamy sand, sand, or fine sandy loam.

The C horizon is brown, very pale brown, or pale brown. It is loamy fine sand, loamy sand, or sand. Bands or strata of sandy clay loam are few to common and are grayish brown. Balls of clay loam occur in some pedons. A few waterworn pebbles are in some pedons.

Redco series

The Redco series consists of deep clayey upland soils. These soils formed in acid to alkaline clayey sediments. Slopes are 0 to 2 percent.

Typical pedon of Redco clay, 0 to 2 percent slopes; from the intersection of U.S. Highway 75 and U.S. Highway 190 at the courthouse in Huntsville, 3.7 miles east on U.S. Highway 190, 4.2 miles south on Farm Road 2929, 6.1 miles south on Fournotch Road, 500 feet east on firelane, and 325 feet north in timber:

A1—0 to 7 inches; very dark grayish brown (10YR 3/2) clay; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; many medium and coarse roots; few fine pores; surface covered with partly decomposed pine needles and hardwood leaves; slightly acid; clear smooth boundary.

AC1—7 to 18 inches; light brownish gray (10YR 6/2) clay; common medium distinct strong brown (7.5YR 5/6) mottles; moderate fine subangular blocky structure; very hard, very firm, sticky and plastic; many medium and coarse roots; few fine pores; strongly acid; clear smooth boundary.

AC2—18 to 40 inches; light gray (2.5Y 7/2) clay; common medium distinct strong brown (7.5YR 5/8) mottles; moderate fine blocky structure; very hard, very firm, sticky and plastic; many medium and coarse roots; many coarse shiny pressure faces; common intersecting slickensides; few fine black concretions; strongly acid; clear smooth boundary.

AC3—40 to 52 inches; grayish brown (10YR 5/2) clay; few to common fine and medium distinct reddish brown (2.5YR 4/4) mottles; moderate medium blocky structure; very hard, very firm, sticky and plastic; few fine and medium roots; common intersecting slickensides; slightly acid; clear smooth boundary.

AC4—52 to 72 inches; light gray (2.5Y 7/2) clay; many medium distinct yellowish brown (10YR 5/4) mottles; moderate medium and coarse blocky structure; very hard, very firm, sticky and plastic; few fine and medium roots; few fine concretions of calcium carbonate; few coarse intersecting slickensides; mildly alkaline.

Soil thickness ranges from 60 to more than 100 inches. Intersecting slickensides and wedge-shaped parallelepipeds begin at a depth of 10 to 25 inches. Undisturbed areas have a gilgai microrelief consisting of microknolls 4 to 10 feet or more in diameter and 2 to 10 inches higher than the microdepressions.

The A1 horizon is very dark grayish brown, dark grayish brown, grayish brown, dark brown, or brown. Some pedons have few to common, faint to distinct mottles of brown, dark brown, strong brown, yellowish red, and

reddish yellow. The A horizon ranges from slightly acid to strongly acid.

The AC horizon is light gray, light brownish gray, light olive gray, gray, dark gray, grayish brown, olive gray, or dark olive gray. Mottles are few to many, faint to prominent brown, yellow, yellowish red, strong brown, brownish yellow, yellowish brown, reddish brown, olive, and red. Reaction ranges from medium acid to very strongly acid in the AC1 and AC2 horizons and from slightly acid to moderately alkaline in the AC3 and AC4 horizons. Black to dark brown concretions range from none to common throughout. Concretions of calcium carbonate are in the lower horizons of some pedons.

Rosenwall series

The Rosenwall series consists of loamy upland soils. These soils formed in clayey deposits interbedded with sandstone and shaly clay. Slopes are 1 to 5 percent.

Typical pedon of Rosenwall fine sandy loam in an area of Rosenwall-Goreen association, gently undulating; from the intersection of the Walker-Trinity County line and Farm Road 230, 2.1 miles west on Farm Road 230, 4.1 miles north on Chalk Cemetery Road, 1,100 feet west on logging road, and 90 feet south in timber:

A1—0 to 6 inches; brown (10YR 4/3) fine sandy loam; weak granular structure; slightly hard, friable; many fine, medium, and coarse roots; common very fine pores; few siliceous pebbles 3/4 to 1-1/4 inches in diameter; slightly acid; clear smooth boundary.

B21t—6 to 12 inches; dark red (2.5YR 3/6) clay; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; many fine, medium, and coarse roots; few fine pores; thin patchy clay films on faces of peds; very strongy acid; clear smooth boundary.

B22t—12 to 16 inches; dark red (2.5YR 3/6) clay; many fine distinct mottles of brown and yellowish red; strong fine subangular blocky structure; very hard, firm, sticky and plastic; many medium and coarse roots; thin patchy clay films on faces of peds; few fragments of gray shale; very strongly acid; clear smooth boundary.

B23t—16 to 20 inches; reddish brown (5YR 4/3) clay; common fine distinct mottles of red and grayish brown; strong fine subangular blocky structure; very hard, firm, sticky and plastic; many medium and coarse roots; few fine pores; thin patchy clay films on faces of peds; common fragments of shale 5 to 15 mm in diameter; very strongly acid; clear smooth boundary.

B3—20 to 27 inches; stratified dark reddish gray (5YR 4/2) clay and gray shaly clay; common fine distinct dark red mottles and coatings; weak fine subangular blocky structure; very hard, firm, sticky and plastic; few medium and coarse roots; few fine pores; very strongly acid; clear smooth boundary.

Cr—27 to 30 inches; strongly cemented sandstone thinly stratified with gray shale; massive; hard; interstices filled with gray clay.

The solum is 20 to 40 inches thick.

The A horizon is very dark grayish brown, dark grayish brown, grayish brown, brown, or dark brown. It is slightly acid to very strongly acid.

The B2t horizon is medium acid to very strongly acid.

The B21t horizon is dark red, red, yellowish red, reddish brown, or dark reddish brown. Some pedons are mottled dark red, strong brown, and light brownish gray.

The B22t horizon is dark red, red, reddish brown, yellowish red, reddish gray, grayish brown, or brown. It is mottled in shades of red, gray, yellow, and brown.

The B23t horizon is reddish brown, dark grayish brown, dark gray, gray, brown, or dark reddish gray. It is mottled red, dark red, strong brown, grayish brown, reddish brown, pale brown, and brownish yellow.

The B3 horizon is dark reddish gray, reddish gray, dark gray, grayish brown, brown, dark brown, or light brownish gray. It is stratified clay, shaly clay, fragments of shale, and sandstone. The strata are 1/4 to 1 inch or more thick.

The Cr horizon is weakly to strongly cemented sandstone or siltstone interbedded with shale, shaly clay, or loamy sediments.

Trinity series

The Trinity series consists of deep clayey soils on flood plains. These soils formed in recent alkaline clayey sediments. Slopes are from 0 to 1 percent.

Typical pedon of Trinity clay, in an area of Trinity soils, frequently flooded; from the intersection of U.S. Highway 75 and Texas Highway 150 in New Waverly, 5.0 miles east on Texas Highway 150, 4.0 miles northeast on Farm Road 2778, 0.9 mile north on farm road into Winters Bayou bottom, and 50 feet east in pasture:

A11—0 to 11 inches; very dark gray (10YR 3/1) clay; moderate fine subangular blocky structure; firm, very hard, sticky and plastic; many fine roots; moderately alkaline; clear smooth boundary.

A12—11 to 41 inches; black (N 2/0) clay; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; few 5 to 10 mm concretions of calcium carbonate; moderately alkaline; clear smooth boundary.

A13—41 to 60 inches; very dark gray (N 3/0) clay; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; common 5 to 10 mm concretions of calcium carbonate; shiny pressure faces; few slickensides that do not intersect; moderately alkaline.

The A horizon extends to a depth of 40 to 60 inches. The soil is moderately or mildly alkaline.

The A1 horizon is black or very dark gray.

The C horizon is gray to light gray clay. It is below 60 to 75 inches.

Woden series

The Woden series consists of deep loamy upland soils. These soils formed in unconsolidated loamy sediments. Slopes are 0 to 3 percent.

Typical pedon of Woden fine sandy loam, 0 to 3 percent slopes; from the intersection of U.S. Highway 75 and Texas Highway 150 in New Waverly, 8.3 miles east on Texas Highway 150, 0.6 mile north on county road, and 25 feet west in pasture:

A1—0 to 20 inches; dark brown (7.5YR 4/4) fine sandy loam; massive; slightly hard, very friable; common fine roots; slightly acid; clear smooth boundary.

B21t—20 to 33 inches; reddish brown (5YR 4/4) fine sandy loam; weak coarse blocky structure; hard, friable; common fine roots; thin patchy clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—33 to 44 inches; yellowish red (5YR 4/6) fine sandy loam; weak coarse subangular blocky structure; hard, friable; few fine roots; clay films on faces of peds; some uncoated sand grains; slightly acid; clear smooth boundary.

B23t—44 to 80 inches; reddish brown (5YR 4/4) fine sandy loam; weak coarse blocky structure; hard, friable; few fine roots; clay films on faces of peds; many uncoated sand grains; slightly acid; clear smooth boundary.

Solum thickness ranges from 60 to more than 100 inches.

The A horizon is dark brown, reddish brown, or dark reddish brown. It is slightly acid or medium acid.

The B2t horizon is reddish brown, yellowish red, or red. It is slightly acid or medium acid.

Woodtell series

The Woodtell series consists of deep loamy upland soils. These soils formed in unconsolidated loamy and clayey sediments. Slopes are 1 to 3 percent.

Typical pedon of Woodtell fine sandy loam, 1 to 3 percent slopes; from the intersection of Texas Highway 30 to U.S. Highway 75 in Huntsville, 15.9 miles north on U.S. Highway 75, 3.9 miles west on Round Prairie Road, and 1,200 feet southeast in timber:

A1—0 to 7 inches; light yellowish brown (10YR 6/4) fine sandy loam; massive; hard, friable; many coarse roots; strongly acid; abrupt smooth boundary.

B21t—7 to 13 inches; red (2.5YR 4/8) clay; weak fine and medium blocky structure; firm, sticky and plastic; common coarse roots; very strongly acid; gradual wavy boundary.

B22t—13 to 24 inches; mottled reddish brown (2.5YR 4/4) and grayish brown (10YR 5/2) clay; moderate medium blocky structure; firm, sticky and plastic; common fine roots; ped surfaces have clay films; few slickensides; very strongly acid; gradual wavy boundary.

B23t—24 to 32 inches; mottled grayish brown (10YR 5/2) and dark red (10R 3/6) clay; massive; very firm, sticky and plastic; few nonintersecting slickensides; few white gypsum concretions; very strongly acid; clear wavy boundary.

B24t—32 to 58 inches; mottled dark yellowish brown (10YR 3/4) and brown (10YR 5/3) clay; weak moderate blocky structure; firm, sticky and plastic; few white gypsum concretions; very strongly acid; clear wavy boundary.

C—58 to 80 inches; light brownish gray (2.5Y 6/2) clay loam; few fine distinct brownish yellow and common medium distinct brown (7.5YR 5/4) mottles; massive; friable; very strongly acid.

Solum thickness ranges from 31 to 65 inches.

The A horizon is dark grayish brown or light yellowish brown. It is slightly acid or medium acid.

In places the B21t horizon is mottled with gray or light yellowish brown. It is strongly acid or very strongly acid.

The B22t, B23t, and B24t horizons are mottled in shades of red, gray, and brown. They are medium acid to very strongly acid.

The C horizon is light brownish gray with mottles in shades of yellow and brown. It is clay or clay loam. Reaction ranges from neutral to very strongly acid.

Formation of the soils

The pages that follow describe the factors of soil formation and relate them to the formation of soils in Walker County. They also explain the system of soil classification. Table 20 classifies the soils in the county according to that system.

Factors of soil formation

Soil is the product of the interaction of five major factors of soil formation: climate, living organisms, parent material, topography, and time. If one factor, such as climate or vegetation, is varied, a different kind of soil is formed.

Climate

The humid climate of Walker County, presumed to be similar to the climate existing when the soils formed, has

promoted moderately rapid soil development. The climate is uniform throughout the county, but its effect is modified locally by runoff. Differences among soils in Walker County are not believed to result from climate.

Living organisms

Plants, insects, animals, bacteria, and fungi are important in the formation of soils. Gains in organic matter and nitrogen in the soil, gains or losses in plant nutrients, and changes in soil structure and porosity are some of the changes caused by living organisms.

Vegetation, dominantly timber, has affected soil formation in Walker County more than any other living organism. Soils under timber vegetation generally are low in organic matter content. Some of the upland prairie soils under grass vegetation are medium in organic matter content.

Parent material

Parent material is the unconsolidated mass from which a soil is formed. It determines the limits of the chemical and mineralogical composition of the soil. In Walker County the parent material of most soils is sedimentary and consists of material that has been deposited by water. The parent material of most soils is terrace or beach deposits of noncalcareous, unconsolidated materials ranging from sands to clays. Some soils formed in calcareous clayey sediments.

Kershaw and Nugent soils formed in thick beds of sand. They consist of highly resistant quartz sand and do not have clay-enriched horizons. Annona and Depcor soils formed in loamy deposits, which permitted moderate water movement. These soils have clay-enriched horizons, some of which contain concentrations of iron. Ferris and Houston Black soils formed in calcareous clayey deposits. The clayey material retarded the movement of water and air, and the result is calcareous soils that have no clay-enriched horizons. The parent material in the county is described in more detail under "Geology"

Topography

Topography, or relief, affects soil formation through its influence on drainage, erosion, plant cover, and soil temperature. The topography in Walker County ranges from gently undulating in the southeastern part of the county to rolling along the Trinity River in the northern part.

The soils formed in the gently undulating areas, such as Depcor and Annona soils, as well as those formed in the rolling areas, such as Galilee soils, have distinct horizons throughout.

Time

Time, usually a long time, is required for the formation of soils with distinct horizons. The difference in time that parent material has been in place is generally reflected in the degree of development of the soil profile. The soils in Walker County range from young to old. The young soils have little horizon development, and the old soils have well defined soil horizons. Nugent soils are young soils. They have little horizon development. Except for a slight accumulation of organic matter and a darkening of their surface layer, Nugent soils retain most of the characteristics of their fine sand parent material. Annona soils are older soils. They have well developed soil horizons. They have distinct A and Bt horizons that bear little resemblance to the original parent material.

Processes of soil horizon differentiation

Several processes were involved in the formation of horizons in the soils of Walker County. The three main processes were accumulation of organic matter, leaching of calcium carbonates and bases, and formation and translocation of silicate clay minerals. In most soils, more than one of these processes have been active in the development of horizons.

The accumulation of organic matter in the upper part of the soil to form an A1 horizon has been important. The soils in Walker County range from low to medium in supply of organic matter.

Soil scientists generally agree that the leaching of bases in soils usually precedes translocation of silicate clay minerals. Calcium carbonate has been leached from the upper horizons of all soils in the county except those of the Blackland Prairie. This process contributes to the development of distinct horizons. In many soils of Walker County, the downward translocation of clay minerals has also contributed to horizon development. The Annona, Depcor, and Gomery soils have accumulations of translocated silicate clays in the Bt horizon. The Bt horizon in these soils contains appreciably more silicate clay than the A horizon. Carbonates and soluble salts were probably leached to a considerable extent before the translocation of silicate clays.

Geology

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Walker County lies in the Coastal Plain physiographic region of Texas. All the formations are sedimentary. They dip toward the gulf at low angles and crop out as northeastward-striking bands across the county. The formations are progressively younger to the southeast, towards the Gulf of Mexico. The only unusual structure is a group of northeastward-trending faults that enter the county along its western margin and cross Interstate Highway 45 between Nelson Creek and South Bedias Creek.

Parts of the drainage basins of the Trinity River and the San Jacinto River, both the East and West Forks, are in Walker County. Most of the San Jacinto drainage is down the dip slope of the southward dipping Willis and underlying Fleming Formations. A poorly defined, northward-facing escarpment terminates the Willis-Fleming Highland, north of which the drainage is to the Trinity River. A major exception occurs where the West Fork of the San Jacinto has eroded headward through the escarpment in the west-central part of the county. Here it bifurcates into the prominent West Fork to the west and McGary Creek to the east, both of which occupy the lowland north of the escarpment. In addition, a fault-controlled, northeastward-trending ridge consisting of the Whitsett and Manning Formations of the Jackson Group lies north of the West Fork of the San Jacinto.

In the northern part of the county several streams, for example, Bedias Creek, South Bedias Creek, and Nelson Creek flow parallel to the strike of the sedimentary rocks. These streams have eroded their channels following the alignment of less resistant beds.

On a regional scale, the Catahoula Formation and formations of the Jackson Group hold up the northward-facing Kisatchie Escarpment (*4*). This escarpment extends southward into Texas and eastward into Louisiana. The Trinity River and many other streams in the northern part of Walker County are deflected eastward for short distances at the base of this escarpment. The Neches River to the east is similarly deflected. On some regional maps (*4*) the fault-outlined ridge mentioned previously is considered part of this regional feature.

Topographically both the formations and the soils can be divided into an upland group and a terrace and bottom land group.

The discussion will center around two recent geologic maps (*11*) (*12*) and the general soil map. The Kaufman-Gowker unit on the general soil map occurs on bottom land, and the Kaman-Landman-Elysian variant unit occurs on terraces. The Moten part of the Gomery-Rosenwall-Moten unit also occurs in a terrace position. These very roughly correspond, respectively, to late Pleistocene and Holocene sediments. All other units occur in upland positions. The formations on which they formed range in age from the Eocene, that is, the Yegua Formation, to late Pliocene or early Pleistocene, that is, the Willis Formation. Table 21 is a summary of the formation-soil unit relationships.

The oldest geologic unit in the county is the Eocene Yegua Formation. It crops out only in the northern part of the county just south of the flood plain of Bedias Creek. In Walker County it is largely gray to reddish brown silty clay and locally cross-bedded sandstone and some bentonitic clay (altered volcanic ash). Where it crops out along U.S. Highway 75 just south of Bedias Creek, it contains many flat ironstone concretions, some over a foot in diameter.

The Yegua is continental, mostly fluviatile, in origin (*6*). Most of the outcrop is the Woodtell-Falba unit. Some is to the northeast, in the Falba-Elmina-Arriola unit.

Overlying the Yegua Formation are several units of the Jackson Group: the Caddell Formation, the lowest and oldest, the Wellborn Formation, the Manning Formation, and the Whitsett Formation, the highest and youngest. The Whitsett contains more quartz sand than the others. The proportion of sandstone decreases with increasing age. The Caddell contains the most clay, mudstone (a nonfissile shale), and shale. Lignite beds and fossil wood occur in all formations. The Whitsett has considerable amounts of volcanic ash which to a minor extent occurs in most of the others. Glauconite (a green iron silicate indicating marine deposition) is restricted to the Wellborn and Caddell as are imprints of marine macrofossils, such as bivalve pelecypods.

The four formations of the Jackson Group, according to Fisher and others (*5*), represent a prograding "fluvial-delta" system advancing into an adjacent regressing, or retreating, sea to the southeast. The upper formations, the Whitsett and the Manning, are probably fluviatile and delta plain, respectively, in origin. The lower formations, the Wellborn and the Caddell, were deposited in shallow coastal waters as delta front and prodelta materials, respectively.

On the north of the Trinity River, the rocks of the Jackson Group occupy most of the Gomery-Rosenwall-Moten unit; on the south side, they occupy part of the Woodtell-Falba unit and approximately the northwestern half of the Falba-Elmina-Arriola unit. Locally the southeastern edge of the isolated patch of the Depcor-Annona-Huntsburg unit crossed by Interstate Highway 45 northwest of Huntsville marks the contact between the Jackson Group and the younger Catahoula Formation to the southeast.

This long outlier of the Depcor-Annona-Huntsburg unit, underlain mainly by the Wellborn and Manning Formations, is on a northeastward-trending ridge. The ridge is related to a subparallel group of faults about 20 miles long and 3 miles wide. The faults are referred to by Renick (*6*) as the Singleton faults, for they extend northeastward into Walker County from the town of Singleton in adjacent Grimes County.

Both the Yegua and Manning Formations in Walker County contain potentially recoverable reserves of lignite (*3*).

The Catahoula Formation of Miocene age crops out next to the southeast. The southeastern limits of the formation fall approximately along State Highway 30, west of Huntsville and along State Highway 19, northeast of Huntsville, except for a part extending about 3 miles south of this highway near Riverside.

The exposed parts of the Catahoula are mainly sandstone and mudstone containing large amounts of volcanic ash, or tuff, and weathered or altered volcanic ash. Volcanic ash, mostly tiny glass shards, in many places alters to a bentonitic clay, a clay high in montmorillonite.

Some of the ash and bentonitic clay is in its place of deposition; some was moved and reworked by streams. The Catahoula is mainly a fluviatile deposit of these various volcanically derived products (*4*) (*6*).

The Riverside mining district (*4*) in the northeastern part of the county south of the Trinity River has several pits in which tuffaceous sandstone and bentonitic clays are exposed. The products from these pits have been marketed as drilling muds, as bleaching clay, "naturally active" clays, or "fullers earth," and as carriers for insecticides. Good exposures of the Catahoula can be seen along State Highway 19, northeast of Huntsville and just southwest of the flood plain of the Trinity River.

The Catahoula Formation is restricted mostly to the Falba-Elmina-Arriola unit, which south of the Trinity River includes most of the Jackson Group. Probably the major reason for the lack of formational differentiation within this unit is that almost all formations of the Jackson Group contain some tuffaceous or bentonitic materials from which montmorillonite-rich soils are derived.

The outcrop area of the Fleming Formation of Miocene age lies southeast of that of the Catahoula. Much of the Fleming is a calcareous clay with calcareous concretions. Some of the Fleming is silty clay, silt, and cross-bedded sandstone, only some of which is calcareous. The outcrop area of the Fleming is generally coextensive with that of the overlying but discontinuous Willis Formation which occupies the higher topographic positions. The Fleming is mainly fluviatile in origin (*6*).

The Fleming and Willis Formations both occupy the Depcor-Annona-Huntsburg unit. The Fleming, in particular, also underlies part of the Falba-Elmina-Arriola unit north of Dodge along Farm Road 405, in the northeastern part of the county.

The inclusions of the Ferris-Annona-Houston Black unit within the larger Depcor-Annona-Huntsburg unit are places where the clayey Fleming Formation crops out. The fine sandy loam surface of the Annona may be a Willis-derived residuum. None of the Willis Formation is mapped within the area of this unit.

In the Depcor-Annona-Huntsburg unit, much of the Depcor soil developed in the Willis Formation, certainly those parts containing siliceous pebbles. Undoubtedly some of the coarser noncalcareous, pebble-free parts of the Fleming Formation underlie the Depcor soil in many places. These parts of the Fleming might be considered as parts of the Oakville Sandstone in other counties. Areas of Annona, Leson, Redco, and Houston Black soils in this unit developed on the Fleming.

The Willis, in many places, is the coarsest textured of the upland formations. It contains all sizes of material, from gravel to clay. Most of the gravel is siliceous and includes fragments of silicified or petrified wood. The formation was fluviatile in origin, probably was more extensive than at present, and covered most of the Fleming outcrop areas.

In the Depcor-Annona-Huntsburg unit, the Willis Formation probably underlies the Conroe, Gunter, and some of the Depcor soils. The occurrence of these soils in the outlier of this unit to the northwest may indicate the presence of a previously unmapped portion of the Willis within the outcrop area of the Jackson Group.

The Conroe unit in the southeast corner of the county also developed on the Willis. Soils like the Conroe, rich in plinthite and ironstone concretions, are strip mined in many places for road surfacing material.

The Beaumont Formation occurs in Walker County in high terrace positions along the Trinity River. The most extensive Beaumont terrace is north of the Trinity at the southwestern edge of the Gomery-Rosenwall-Moten unit. It is approximately bordered on the south by Farm Road 230 and on the east by Dillard Creek. Whites Creek traverses the corner of the terrace.

Soils in the Gomery-Rosenwall-Moten unit on the Beaumont terrace include the Moten, Annona, Redco, and Lufkin soils, which do not occur in the adjacent upland to the north.

The Beaumont Formation is an extensive coastwise unit in many counties along the Gulf Coast of Texas. Radiocarbon dates indicate that it is more than about 40,000 years old and is possibly Sangamon, a Pleistocene interglacial just before the Wisconsin, in age.

The Deweyville Formation, also in a terrace position but below the level of the Beaumont, is found principally on the south side of the Trinity flood plain. Deweyville terraces along the Trinity River are larger in areas downstream in San Jacinto and Liberty Counties. Radiocarbon dates from these areas suggest a late Pleistocene age, about 12,000 to about 30,000 years old.

Almost all of the Kaman-Landman-Elysian unit falls within the Deweyville Formation.

The Holocene alluvium consists of the flood plain deposits of the Trinity River, the West Fork of the San Jacinto River, and other streams. These fall within the Kaufman-Gowker unit. Though not shown on the general soil map, other streams, such as South Bedias Creek and Nelson Creek, also have flood plains on which these soils have developed.

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Glossary

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Medium	6 to 9
High	More than 9

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Coarse textured (light textured) soil. Sand or loamy sand.

Complex, soil. A map unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Gilgai. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of

resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. Inadequate strength for supporting loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Neutral soil. A soil having a pH value between 6.6 and 7.3.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents that commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on exposure to repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade, whereas ironstone cannot be cut but can be broken or shattered with a spade. Plinthite is one form of the material that has been called laterite.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Soil scientists regard as soil only the part of the regolith that is modified by organisms and other soil-building forces. Most engineers describe the whole regolith, even to a great depth, as "soil."

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface

runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or " very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water. *Water table, apparent.* A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole

after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

ILLUSTRATIONS

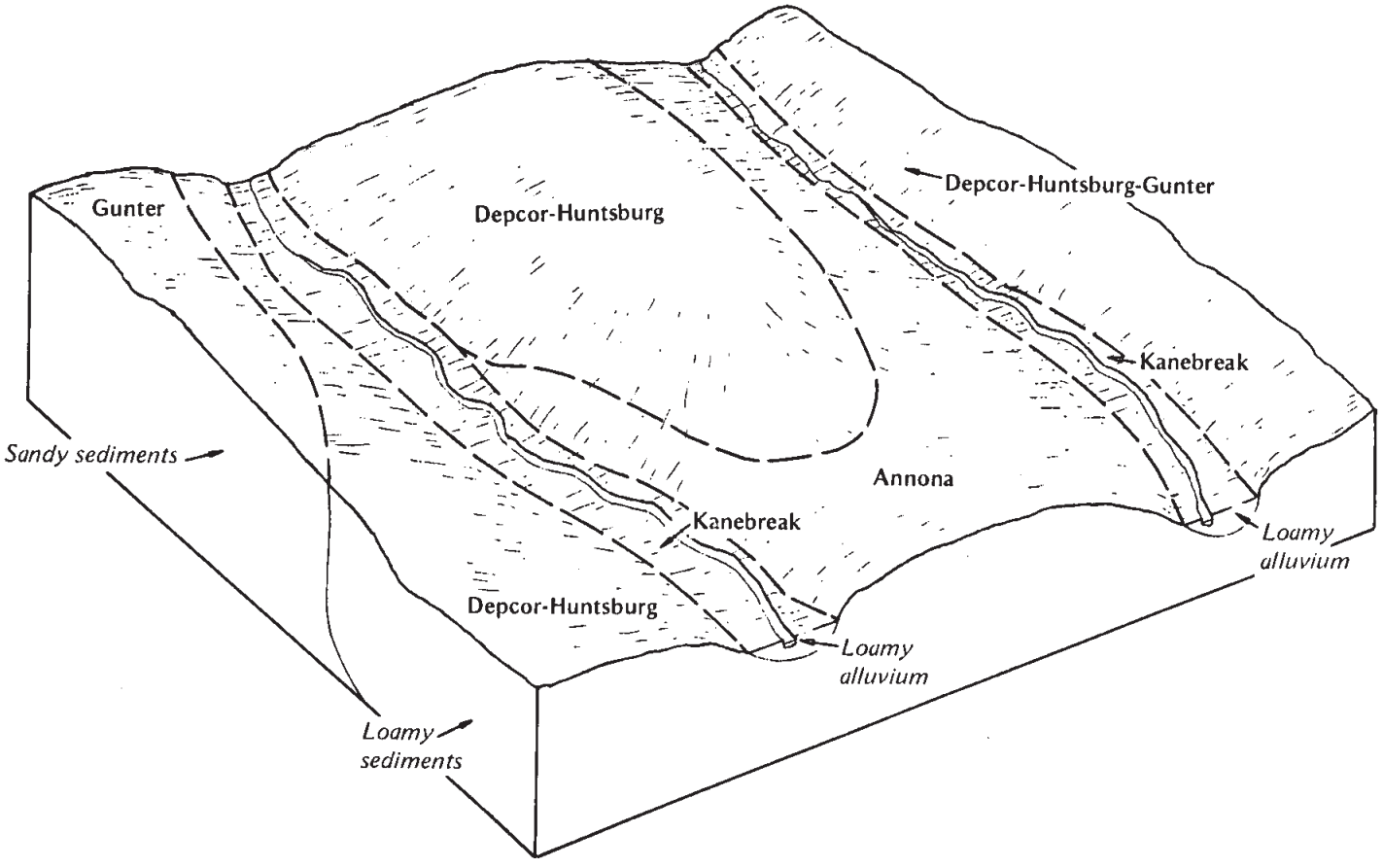

Figure 1.—Pattern of soils in Depcor-Annona-Huntsburg unit.

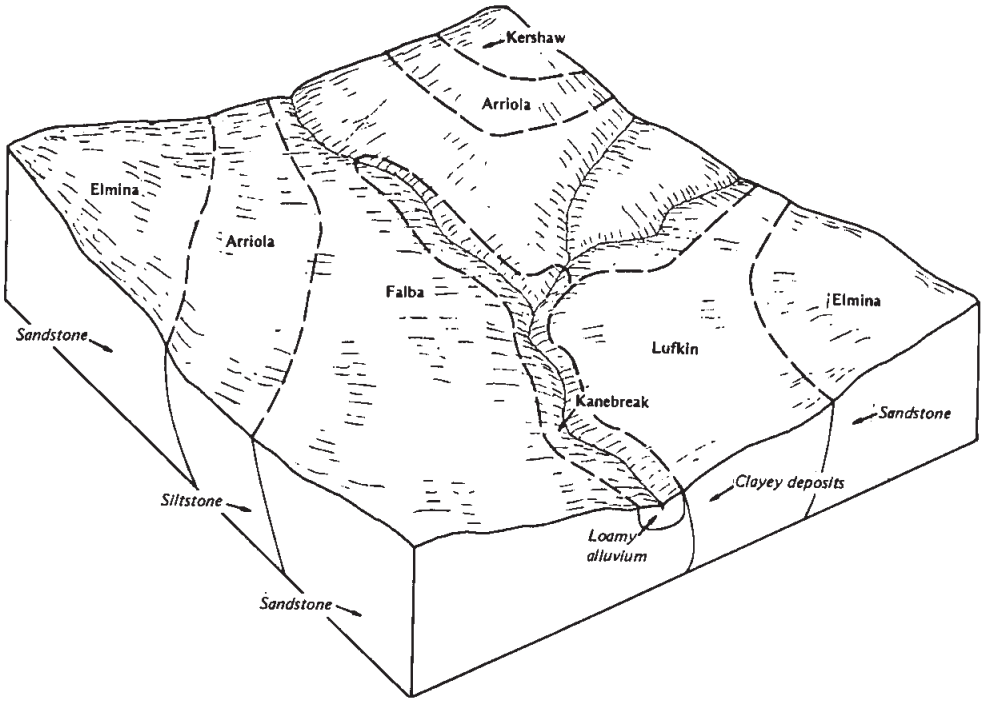

Figure 2.—Pattern of soils in Falba-Elmina-Arriola unit.

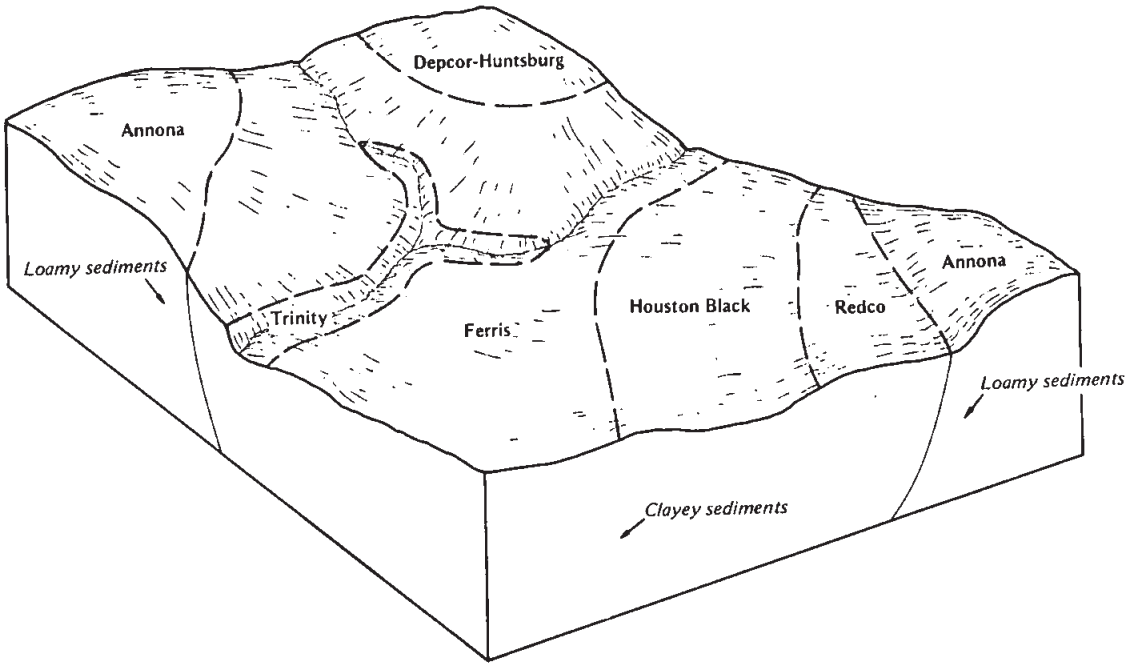

Figure 3.—Pattern of soils in Ferris-Annona-Houston Black unit.

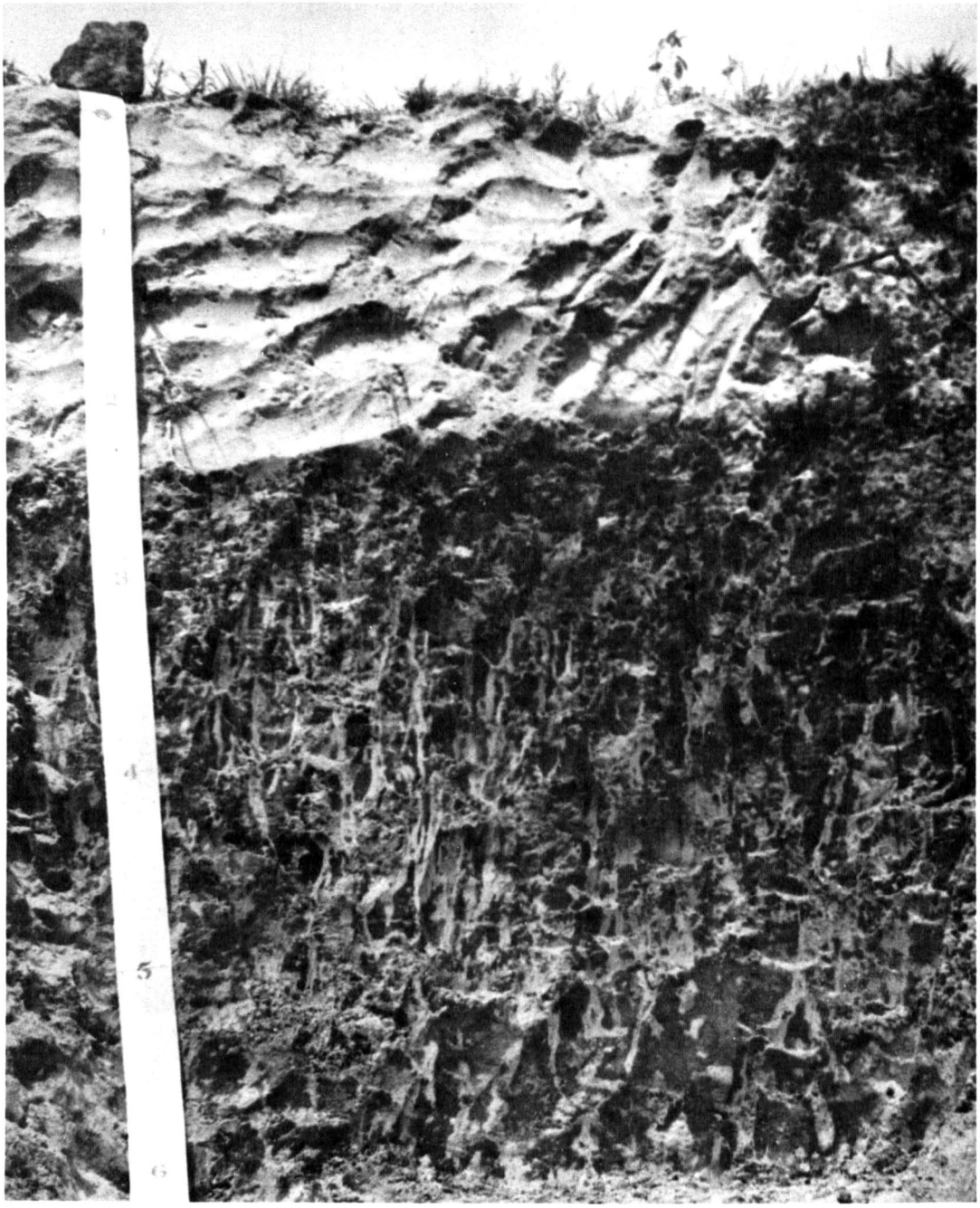

Figure 4.—Profile of Depcor loamy fine sand. The surface layer is 26 inches thick over a mottled sandy clay loam subsoil. The surface layer is very strongly acid.

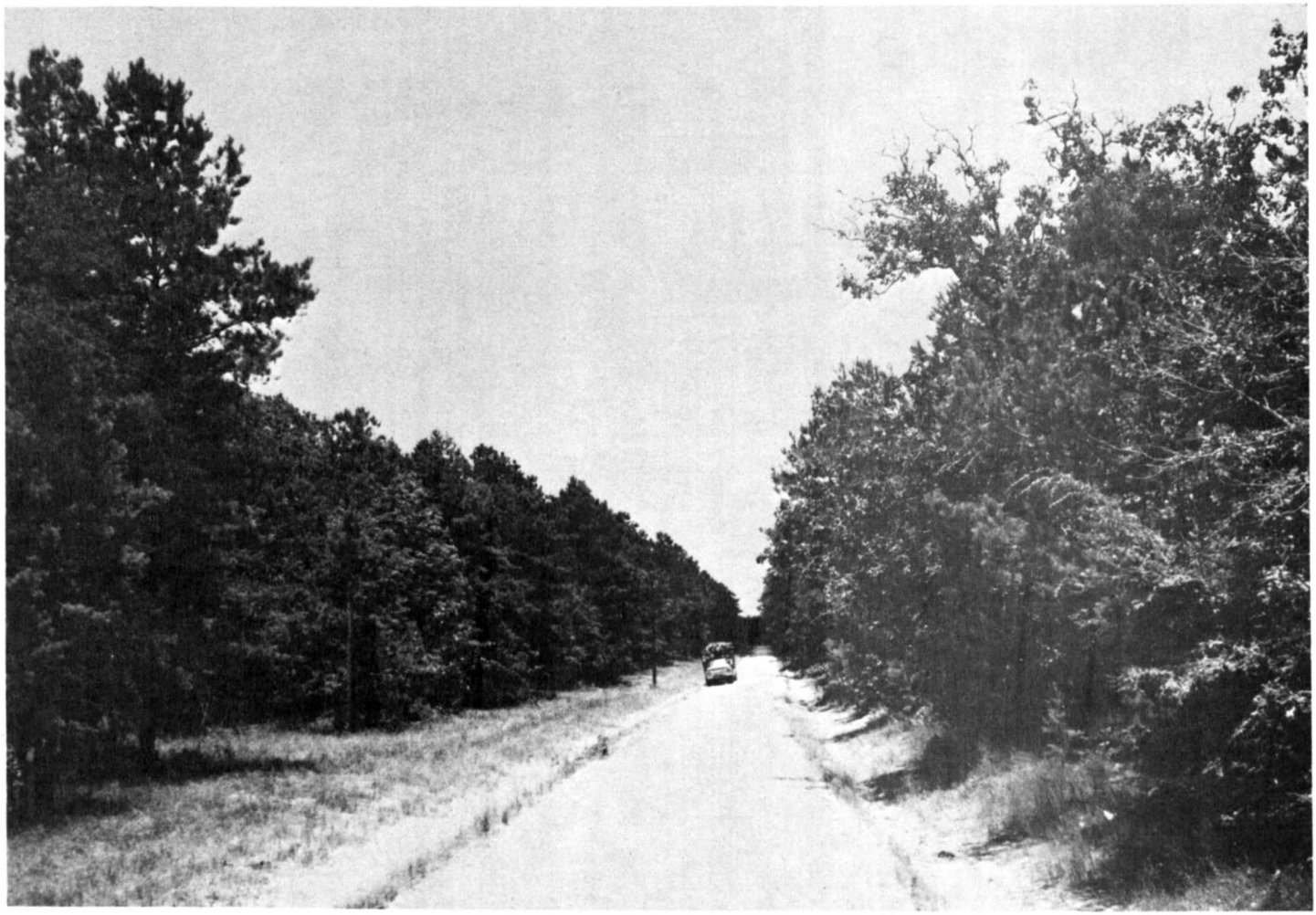

Figure 5.—Loblolly pine on Elmina association, gently undulating.

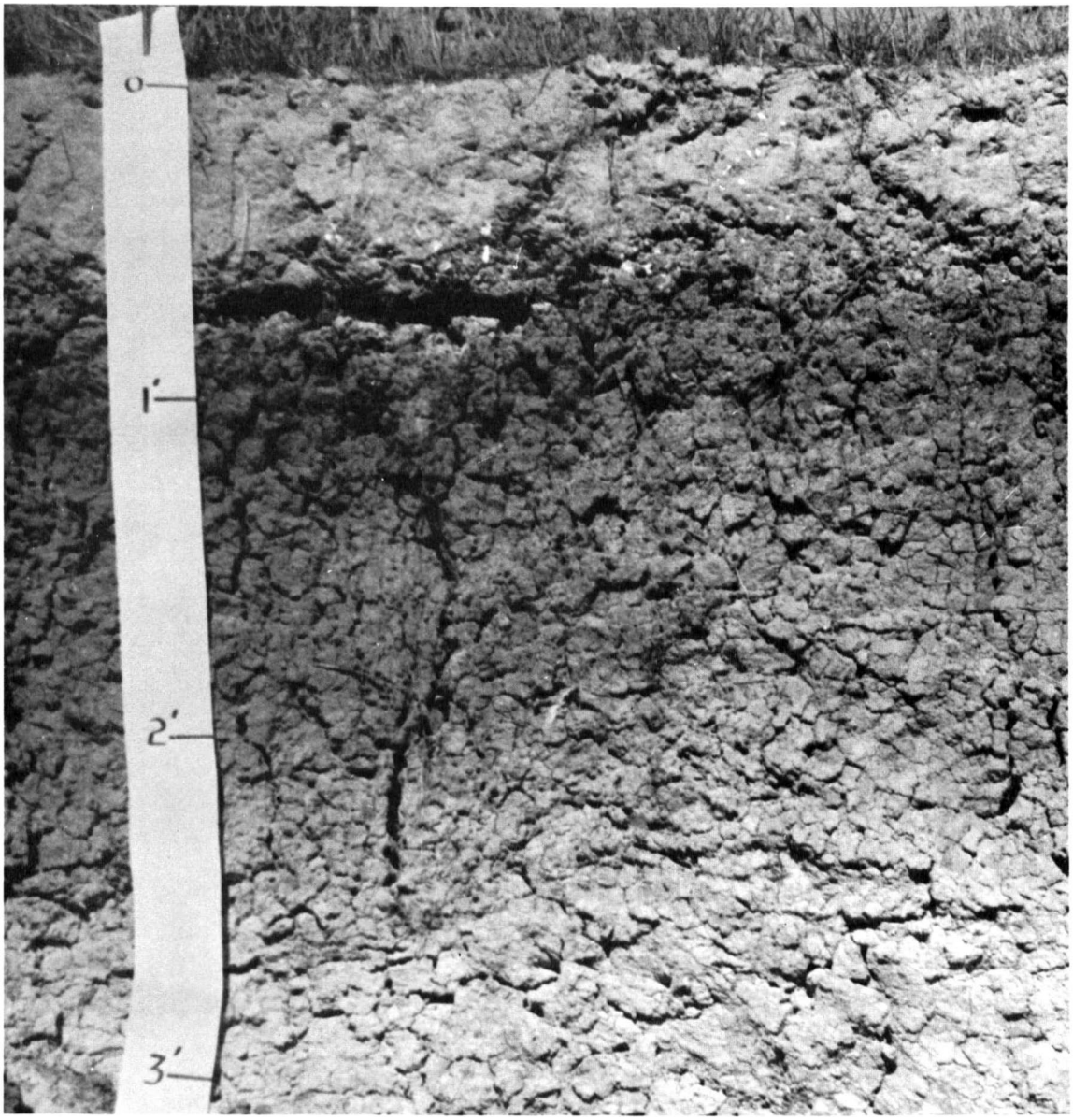

Figure 6.—Profile of Falba fine sandy loam. The surface layer is 5 inches thick over a clayey subsoil. Fine-grained sandstone is at a depth of about 33 inches.

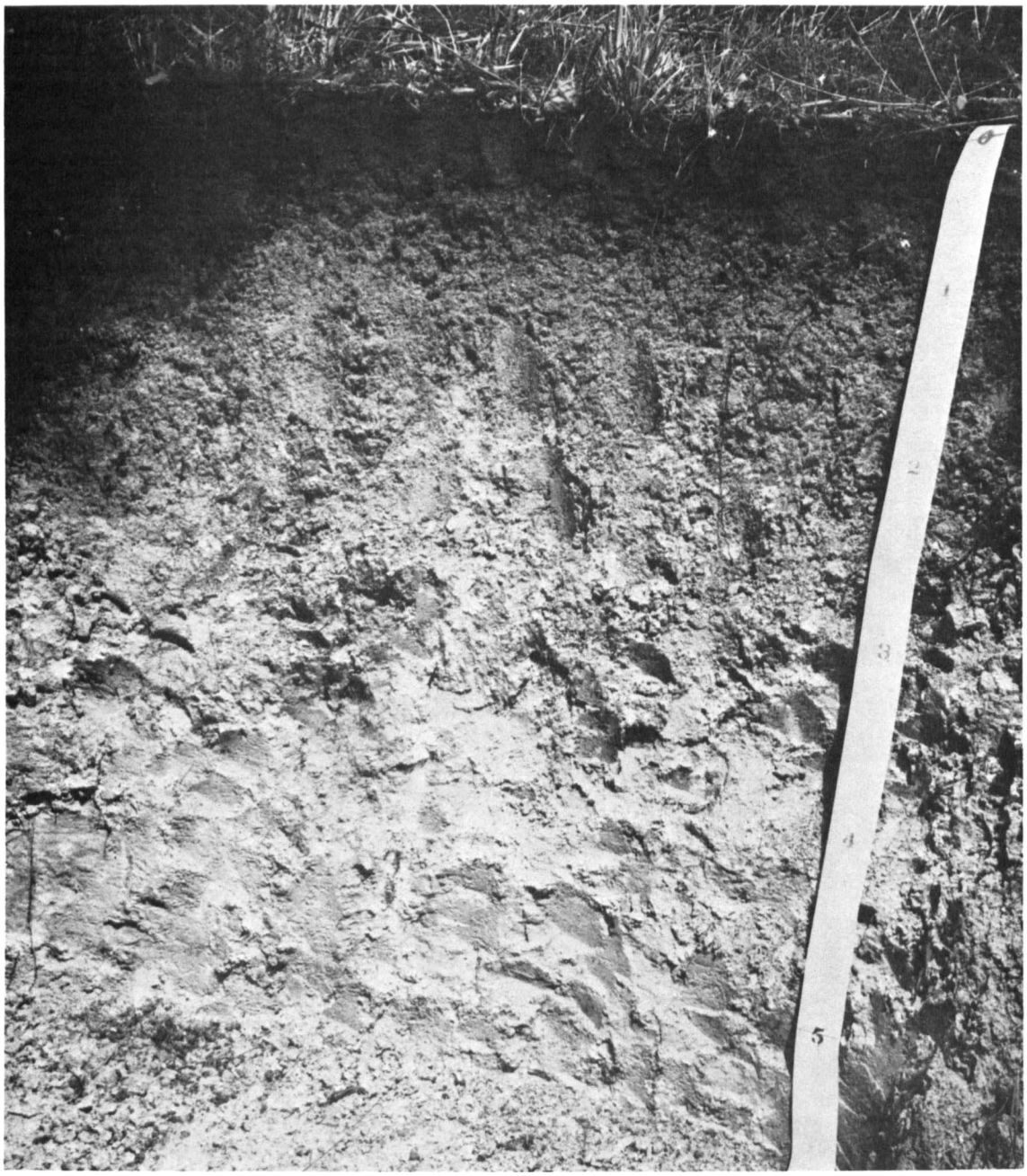

Figure 7.—Profile of Ferris clay in an area of Ferris clay, gullied. The thin, dark-colored surface layer overlies light gray clay.

Figure 8.—Loblolly pine plantation on Gomery association, undulating.

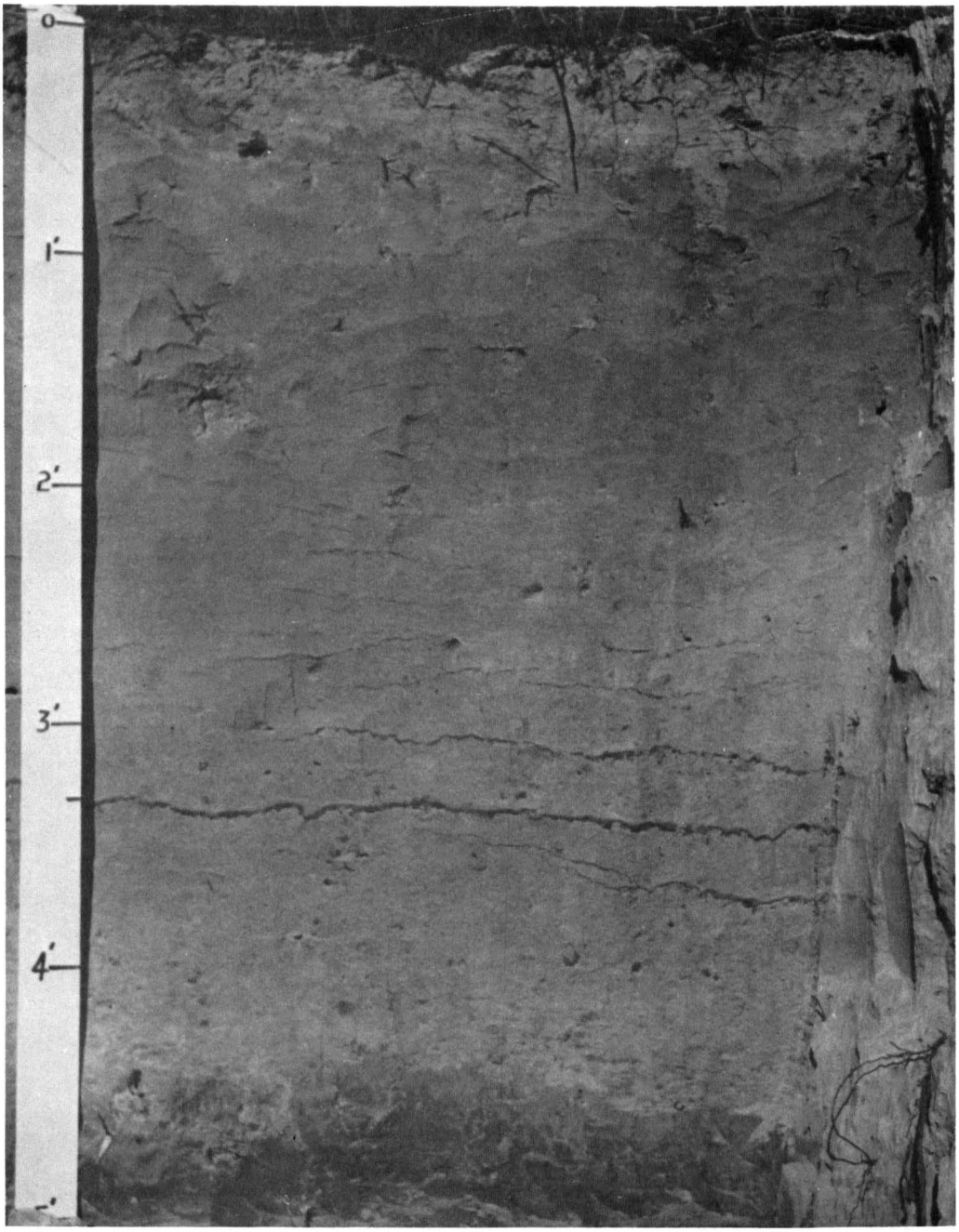

Figure 9.—Profile of Gunter loamy sand. A few thin bands, or lamellae, of loam are at a depth of about 3 feet. The sandy clay loam subsoil is at 4.5 feet.

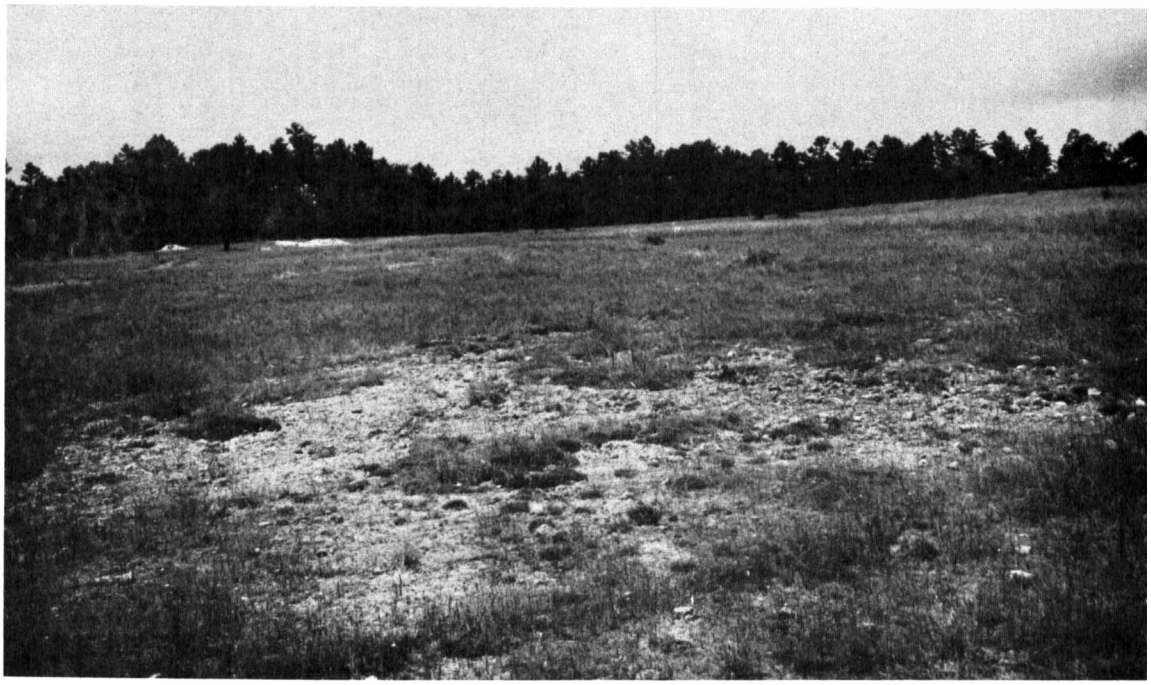

Figure 10.—Area of Kitterll-Rock outcrop complex, 1 to 10 percent slopes. A large area of Rock outcrop is in the foreground.

Figure 11.—Loblolly pine plantation on Rosenwall-Goreen association, gently undulating.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

[Data were recorded in the period 1951-75 at Huntsville, Texas]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	59.4	39.0	49.3	81	16	126	2.96	1.06	4.47	6	.4
February	63.2	41.4	52.3	83	21	143	3.34	1.78	4.61	6	.6
March	70.3	48.0	59.2	88	28	315	2.74	1.29	3.92	5	.0
April	78.3	57.2	67.8	91	36	534	4.74	1.99	6.96	5	.0
May	84.9	64.0	74.4	95	48	756	4.63	2.41	6.44	6	.0
June	91.4	69.7	80.5	100	59	915	3.92	1.19	6.10	5	.0
July	94.9	72.0	83.5	103	64	1,039	2.63	1.39	3.63	5	.0
August	94.6	71.2	82.9	103	62	1,020	3.30	1.16	5.01	5	.0
September	89.0	66.2	77.6	100	49	828	4.70	1.84	7.00	6	.0
October	81.2	57.0	69.1	94	38	592	3.69	1.17	5.72	4	.0
November	69.6	47.3	58.5	87	27	271	3.49	1.31	5.23	6	.0
December	62.0	41.0	51.6	80	20	133	4.04	2.51	5.42	6	.0
Yearly:											
Average	78.2	56.2	67.2	---	---	---	---	---	---	---	---
Extreme	---	---	---	104	15	---	---	---	---	---	---
Total	---	---	---	---	---	6,672	44.18	35.27	52.61	65	1.0

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data were recorded in the period 1951-75 at Huntsville, Texas]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	February 25	March 12	March 24
2 years in 10 later than--	February 15	March 3	March 18
5 years in 10 later than--	January 28	February 13	March 7
First freezing temperature in fall:			
1 year in 10 earlier than--	December 5	November 13	November 1
2 years in 10 earlier than--	December 14	November 21	November 10
5 years in 10 earlier than--	December 30	December 8	November 26

TABLE 3.--GROWING SEASON LENGTH

[Data were recorded in the period 1951-75 at Huntsville, Texas]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	299	261	234
8 years in 10	309	274	244
5 years in 10	331	297	264
2 years in 10	>365	321	284
1 year in 10	>365	333	294

TABLE 4.--POTENTIALS AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP FOR SPECIFIED USES

Map unit	Percent of county	Cultivated farm crops	Pasture	Woodland	Urban uses	Recreation areas
1. Depcor-Annona-Huntsburg.	40	Medium: wetness.	High	High	Low: shrink-swell, percs slowly.	Low: too sandy, wetness.
2. Falba-Elmina-Arriola.	38	Low: rooting depth.	Low: rooting depth.	Low: droughty.	Low: shrink-swell, percs slowly.	Low: percs slowly, wetness.
3. Ferris-Annona-Houston Black.	6	Medium: erodes easily.	Medium: erodes easily.	Low: droughty.	Low: shrink-swell, percs slowly.	Low: too clayey.
4. Kaufman-Gowker	6	Medium: floods.	High	High	Low: shrink-swell, floods.	Low: floods, too clayey, wetness.
5. Gomery-Rosenwall-Moten.	5	Low: rooting depth.	High	Medium: droughty.	Low: wetness.	Low: too sandy, percs slowly.
6. Kaman-Landman-Elysian variant.	2	High	High	High	Low: shrink-swell, floods, wetness.	Low: floods, wetness.
7. Woodtell-Falba	2	Medium: wetness.	Medium: wetness.	Low: claypan, droughty.	Low: shrink-swell, percs slowly.	Low: percs slowly, slope.
8. Conroe	1	Medium: rooting depth.	Low: rooting depth.	Medium: droughty, rooting depth.	Medium: percs slowly, corrosive.	Medium: too sandy.

TABLE 5.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Annona-Urban land complex, 1 to 8 percent slopes	1,760	0.3
2	Annona association, gently undulating	45,180	8.9
3	Annona association, gently rolling	23,590	4.7
4	Arol fine sandy loam, 0 to 1 percent slopes	2,440	0.5
5	Arol fine sandy loam, 1 to 3 percent slopes	7,300	1.4
6	Arriola fine sandy loam, 1 to 5 percent slopes	14,390	2.8
7	Conroe association, gently undulating	3,810	0.8
8	Depcor-Urban land complex, 1 to 8 percent slopes	520	0.1
9	Depcor-Huntsburg association, gently undulating	81,620	16.2
10	Depcor-Huntsburg-Gunter association, gently rolling	30,520	6.0
11	Elmina association, gently undulating	37,700	7.5
12	Falba fine sandy loam, 0 to 1 percent slopes	5,120	1.0
13	Falba fine sandy loam, 1 to 5 percent slopes	54,600	10.8
14	Falba complex, 5 to 8 percent slopes	5,900	1.2
15	Falba and Arol soils, 1 to 5 percent slopes, eroded	9,060	1.8
16	Ferris clay, 1 to 5 percent slopes	13,880	2.7
17	Ferris clay, gullied	1,440	0.3
18	Galilee-Gomery association, rolling	4,640	0.9
19	Gladewater clay, frequently flooded	3,770	0.7
20	Gomery association, undulating	14,350	2.8
21	Gowker and Kanebreak soils, frequently flooded	16,100	3.2
22	Gunter association, undulating	17,090	3.4
23	Houston Black clay, 1 to 3 percent slopes	6,190	1.2
24	Houston Black-Urban land complex, 1 to 3 percent slopes	140	*
25	Kaman clay, occasionally flooded	2,710	0.5
26	Kaman-Elysian Variant complex, 0 to 2 percent slopes	4,830	1.0
27	Kanebreak soils, frequently flooded	24,670	4.9
28	Kaufman clay, occasionally flooded	12,400	2.5
29	Kaufman-Gowker complex, frequently flooded	5,620	1.1
30	Kershaw sand, 0 to 5 percent slopes	830	0.2
31	Kitterll-Rock outcrop complex, 1 to 10 percent slopes	3,920	0.8
32	Landman association, gently undulating	5,790	1.1
33	Leson clay, 0 to 3 percent slopes	5,600	1.1
34	Lufkin fine sandy loam, 0 to 1 percent slopes	3,430	0.7
35	Lufkin-Annona association, nearly level	2,310	0.5
36	Moten fine sandy loam, 0 to 2 percent slopes	3,260	0.6
37	Nugent soils, frequently flooded	4,130	0.8
38	Pits	260	0.1
39	Redco clay, 0 to 2 percent slopes	5,740	1.1
40	Rosenwall-Goreen association, gently undulating	8,860	1.8
41	Trinity soils, frequently flooded	3,160	0.6
42	Woden fine sandy loam, 0 to 3 percent slopes	330	0.1
43	Woodtell fine sandy loam, 1 to 3 percent slopes	2,890	0.6
	Water	3,750	0.7
	Total	505,600	100.0

* Less than 0.1 percent.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	---	---	---	---	---
II	35,422	13,816	21,606	---	---
III	177,060	137,067	13,299	26,694	---
IV	167,725	160,095	---	7,630	---
V	57,449	---	57,449	---	---
VI	58,153	58,153	---	---	---
VII	2,790	---	---	2,790	---
VIII	---	---	---	---	---

TABLE 7.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn	Cotton lint	Grain sorghum	Common bermudagrass	Improved bermudagrass
	Bu	Lb	Bu	AUM*	AUM*
1---------- Annona	---	---	---	---	---
2**---------- Annona	30	300	40	4.7	6.0
3**---------- Annona	---	---	---	---	5.5
4---------- Arol	35	250	45	4.0	5.0
5---------- Arol	30	250	35	4.0	5.0
6---------- Arriola	30	200	---	4.0	5.0
7**---------- Conroe	55	---	---	---	8.0
8---------- Depcor	---	---	---	---	---
9**:					
Depcor----------	40	325	---	4.5	6.5
Huntsburg----------	30	300	---	5.0	6.5
10**:					
Depcor----------	---	---	---	4.5	6.5
Huntsburg----------	---	---	---	5.0	6.0
Gunter----------	---	---	---	5.0	6.0
11**---------- Elmina	30	325	---	4.0	6.0
12---------- Falba	20	150	45	4.0	5.0
13---------- Falba	25	150	35	4.0	5.0
14**---------- Falba	---	---	---	3.0	4.0
15**---------- Falba	17	151	27	3.1	4.0
16---------- Ferris	30	300	45	4.0	5.5
17---------- Ferris	---	---	---	2.0	3.5
18**:					
Galilee----------	---	---	---	2.0	3.0
Gomery----------	---	---	---	4.0	5.5

See footnote at end of table.

TABLE 7.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Cotton lint	Grain sorghum	Common bermudagrass	Improved bermudagrass
	Bu	Lb	Bu	AUM*	AUM*
19--- Gladewater	---	---	---	6.0	7.0
20**--- Gomery	30	325	---	4.0	5.5
21**--- Gowker	---	---	---	6.0	7.0
22**--- Gunter	45	---	---	5.0	6.0
23--- Houston Black	45	400	85	4.0	8.0
24--- Houston Black	---	---	---	---	---
25--- Kaman	50	400	100	4.0	8.0
26**--- Kaman	50	400	100	4.0	8.0
27**--- Kanebreak	---	---	---	5.0	6.0
28--- Kaufman	50	500	100	4.0	8.5
29**--- Kaufman	---	---	---	4.0	8.5
30--- Kershaw	---	---	---	1.0	2.0
31**--- Kitterll	---	---	---	---	---
32**--- Landman	45	325	---	5.5	7.5
33--- Leson	40	400	80	2.5	5.0
34--- Lufkin	35	200	45	4.0	5.0
35**:					
Lufkin---	35	200	45	4.0	5.0
Annona---	40	250	40	4.5	6.0
36--- Moten	20	250	---	4.0	6.0
37**--- Nugent	---	---	---	7.0	10.0
38**. Pits					
39--- Redco	30	250	45	5.0	8.5
40**:					
Rosenwall---	30	200	---	4.0	5.0

See footnote at end of table.

TABLE 7.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Cotton lint	Grain sorghum	Common bermudagrass	Improved bermudagrass
	Bu	Lb	Bu	AUM*	AUM*
40**: Goreen	30	200	---	4.0	5.0
41**---------- Trinity	---	---	---	7.0	8.0
42---------- Woden	50	400	---	---	10
43---------- Woodtell	35	250	55	6.5	7.5

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

[Only the soils that support rangeland vegetation suitable for grazing are listed]

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
4, 5---------- Arol	Claypan Savannah----------	Favorable	5,500	Little bluestem----------	40
		Normal	4,500	Indiangrass----------	10
		Unfavorable	2,500	Brownseed paspalum----------	10
				Purpletop----------	5
				Post oak----------	5
				Blackjack oak----------	5
12, 13, 14*-------- Falba	Claypan Savannah----------	Favorable	5,500	Little bluestem----------	40
		Normal	4,000	Indiangrass----------	10
		Unfavorable	2,500	Brownseed paspalum----------	10
				Purpletop----------	5
				Post oak----------	5
				Blackjack oak----------	5
15*:					
Falba----------	Claypan Savannah----------	Favorable	5,500	Little bluestem----------	40
		Normal	4,000	Indiangrass----------	10
		Unfavorable	2,500	Brownseed paspalum----------	10
				Purpletop----------	5
				Post oak----------	5
				Blackjack oak----------	5
Arol----------	Claypan Savannah----------	Favorable	5,500	Little bluestem----------	40
		Normal	4,500	Indiangrass----------	10
		Unfavorable	2,500	Brownseed paspalum----------	10
				Purpletop----------	5
				Post oak----------	5
				Blackjack oak----------	5
16, 17---------- Ferris	Eroded Blackland----------	Favorable	7,000	Little bluestem----------	30
		Normal	5,500	Indiangrass----------	15
		Unfavorable	4,000	Big bluestem----------	15
				Switchgrass----------	5
				Florida paspalum----------	5
				Eastern gamagrass----------	5
				Virginia wildrye----------	5
				Sideoats grama----------	5
				Texas needlegrass----------	5
				Meadow dropseed----------	5
23---------- Houston Black	Blackland----------	Favorable	7,000	Little bluestem----------	50
		Normal	6,000	Indiangrass----------	25
		Unfavorable	3,500	Switchgrass----------	5
				Sideoats grama----------	5
				Vine-mesquite----------	5
33---------- Leson	Blackland----------	Favorable	8,500	Indiangrass----------	15
		Normal	7,000	Big bluestem----------	15
		Unfavorable	5,000	Eastern gamagrass----------	15
				Little bluestem----------	10
				Switchgrass----------	10
				Virginia wildrye----------	5
				Florida paspalum----------	5
				Sideoats grama----------	5
				Texas needlegrass----------	5
				Dropseed----------	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available. Site index was calculated at age 30 for eastern cottonwood, at age 35 for American sycamore, and at age 50 for all other species]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
2*, 3*---------- Annona	3c	Slight	Moderate	Slight	Slight	Loblolly pine------- Shortleaf pine------ Southern red oak----	80 70 75	Loblolly pine, slash pine.
6---------- Arriola	4c	Slight	Moderate	Slight	Slight	Loblolly pine------- Shortleaf pine------	70 60	Loblolly pine, slash pine.
7*---------- Conroe	3s	Slight	Slight	Slight	Slight	Loblolly pine------- Shortleaf pine------	80 70	Loblolly pine, slash pine.
9*: Depcor----------	3s	Slight	Moderate	Moderate	Slight	Loblolly pine------- Shortleaf pine------ Southern red oak----	80 70 ---	Loblolly pine, slash pine.
Huntsburg---------	3s	Moderate	Moderate	Moderate	Slight	Loblolly pine------- Shortleaf pine------	84 78	Loblolly pine.
10*: Depcor----------	2s	Slight	Moderate	Moderate	Slight	Loblolly pine------- Shortleaf pine------ Southern red oak----	90 84 ---	Loblolly pine, slash pine.
Huntsburg---------	2s	Moderate	Moderate	Moderate	Slight	Loblolly pine------- Shortleaf pine------	94 81	Loblolly pine.
Gunter----------	3s	Slight	Moderate	Moderate	Moderate	Loblolly pine------- Shortleaf pine------	80 70	Loblolly pine, slash pine.
11*---------- Elmina	3s	Slight	Moderate	Moderate	Slight	Loblolly pine------- Shortleaf pine------	80 70	Loblolly pine, slash pine.
18*: Galilee----------	4s	Moderate	Moderate	Slight	Slight	Loblolly pine------- Shortleaf pine------	70 60	Loblolly pine, slash pine.
Gomery----------	3s	Slight	Slight	Moderate	Slight	Loblolly pine------- Shortleaf pine------ Southern red oak----	80 70 ---	Loblolly pine, slash pine.
19---------- Gladewater	2w	Slight	Severe	Moderate	Severe	Water oak---------- Willow oak---------- Green ash----------	90 90 ---	Water oak, sweetgum.
20*---------- Gomery	3s	Slight	Slight	Moderate	Slight	Loblolly pine------- Shortleaf pine------ Southern red oak----	80 70 ---	Loblolly pine, slash pine.
21*: Gowker----------	1w	Slight	Moderate	Moderate	Moderate	Eastern cottonwood-- Sweetgum---------- Southern red oak---- American sycamore--- White oak---------- Green ash----------	100 100 --- --- --- ---	Eastern cottonwood, American sycamore, sweetgum.
Kanebreak---------	2w	Slight	Moderate	Slight	Moderate	Loblolly pine------- Sweetgum---------- Water oak---------- Southern red oak---- White oak----------	90 90 90 80 ---	Loblolly pine, slash pine, American sycamore.

See footnote at end of table.

TABLE 9.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
22* Gunter	3s	Slight	Moderate	Moderate	Moderate	Loblolly pine Shortleaf pine	80 70	Loblolly pine, slash pine.
25 Kaman	1w	Slight	Severe	Severe	Moderate	Sweetgum Water oak	100 ---	
26*: Kaman	1w	Slight	Severe	Severe	Moderate	Sweetgum Water oak	100 ---	
Elysian variant	3w	Slight	Moderate	Slight	Moderate	Loblolly pine Shortleaf pine Sweetgum	80 70 80	Loblolly pine, slash pine, shortleaf pine.
27* Kanebreak	2w	Slight	Moderate	Slight	Moderate	Loblolly pine Sweetgum Water oak Southern red oak White oak	90 90 90 80 ---	Loblolly pine, slash pine, American sycamore.
28 Kaufman	1w	Slight	Moderate	Moderate	Severe	Eastern cottonwood Sweetgum Water oak Green ash	110 100 --- ---	Eastern cottonwood, green ash, pecan, sweetgum.
29*: Kaufman	1w	Slight	Moderate	Moderate	Severe	Eastern cottonwood Sweetgum Water oak Green ash	110 100 --- ---	Eastern cottonwood, green ash, pecan, sweetgum.
Gowker	1w	Slight	Moderate	Moderate	Moderate	Eastern cottonwood Sweetgum Southern red oak American sycamore White oak Green ash	100 100 --- --- --- ---	Eastern cottonwood, American sycamore, sweetgum.
30 Kershaw	5s	Slight	Moderate	Severe	Slight	Slash pine Longleaf pine	65 55	Slash pine, longleaf pine.
32* Landman	2s	Slight	Moderate	Moderate	Slight	Loblolly pine Shortleaf pine Southern red oak White oak	90 77 --- ---	Loblolly pine, slash pine.
34 Lufkin	5w	Slight	Moderate	Severe	Slight	Loblolly pine Shortleaf pine	60 50	Loblolly pine.
35*: Lufkin	5w	Slight	Moderate	Severe	Slight	Loblolly pine Shortleaf pine	60 50	Loblolly pine.
Annona	3c	Slight	Moderate	Slight	Slight	Loblolly pine Shortleaf pine Southern red oak	80 70 75	Loblolly pine, slash pine.
36 Moten	3w	Slight	Moderate	Moderate	Moderate	Loblolly pine Shortleaf pine Water oak	80 70 80	Loblolly pine, slash pine.

See footnote at end of table.

TABLE 9.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
37* Nugent	2s	Slight	Moderate	Moderate	Slight	Loblolly pine Slash pine Sweetgum Water oak Willow oak	90 90 95 85 85	Loblolly pine, slash pine, sweetgum, water oak, yellow-poplar.
39 Redco	3c	Slight	Moderate	Moderate	Slight	Loblolly pine Shortleaf pine Water oak Sweetgum	80 70 70 ---	Loblolly pine, slash pine, sweetgum.
40*: Rosenwall	4c	Slight	Moderate	Slight	Slight	Loblolly pine Shortleaf pine	70 60	Loblolly pine, slash pine.
Goreen	4c	Slight	Moderate	Moderate	Slight	Loblolly pine Shortleaf pine	70 60	Loblolly pine.
41* Trinity	1w	Slight	Severe	Moderate	Slight	Eastern cottonwood Pine oak Green ash	106 --- ---	Eastern cottonwood, green ash.
42 Woden	1o	Slight	Slight	Slight	Slight	Loblolly pine Longleaf pine Shortleaf pine Sweetgum Southern red oak	100 90 90 96 90	Loblolly pine, slash pine.
43 Woodtell	4c	Slight	Moderate	Moderate	Moderate	Loblolly pine Shortleaf pine	70 60	Slash pine, loblolly pine.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WOODLAND UNDERSTORY VEGETATION

[Only the soils suitable for production of commercial trees are listed]

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
1*:				
Annona	Favorable	2,500	Little bluestem	15
	Normal	2,000	Brownseed paspalum	15
	Unfavorable	1,000	Panicum	15
			Indiangrass	10
			Longleaf uniola	10
			Purpletop	5
Urban land.				
2*, 3*-	Favorable	2,500	Little bluestem	15
Annona	Normal	2,000	Brownseed paspalum	15
	Unfavorable	1,000	Panicum	15
			Indiangrass	10
			Longleaf uniola	10
			Purpletop	5
6-	Favorable	2,500	Pinehill bluestem	25
Arriola	Normal	1,800	Longleaf uniola	15
	Unfavorable	1,000	Indiangrass	10
			Panicum	10
			Purpletop	5
7*-	Favorable	1,500	Pinehill bluestem	20
Conroe	Normal	1,250	Longleaf uniola	10
	Unfavorable	500	Purpletop	10
			Panicum	10
			American beautyberry	10
			Indiangrass	5
			Sedge	5
8*:				
Depcor	Favorable	3,500	Pinehill bluestem	30
	Normal	2,500	Indiangrass	10
	Unfavorable	1,500	Longleaf uniola	10
			Panicum	10
			Sedge	10
			Switchgrass	5
			Purpletop	5
			Purple lovegrass	5
Urban land.				
9*:				
Depcor	Favorable	3,500	Pinehill bluestem	30
	Normal	2,500	Indiangrass	10
	Unfavorable	1,500	Longleaf uniola	10
			Panicum	10
			Sedge	10
			Switchgrass	5
			Purpletop	5
			Purple lovegrass	5
Huntsburg	Favorable	3,500	Pinehill bluestem	30
	Normal	2,500	Indiangrass	10
	Unfavorable	1,500	Longleaf uniola	10
			Panicum	10
			Sedge	10
			Switchgrass	5
			Purpletop	5
			Purple lovegrass	5

See footnote at end of table.

TABLE 10.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
10*:				
Depcor	Favorable	3,500	Pinehill bluestem	30
	Normal	2,500	Indiangrass	10
	Unfavorable	1,500	Longleaf uniola	10
			Panicum	10
			Sedge	10
			Switchgrass	5
			Purpletop	5
			Purple lovegrass	5
Huntsburg	Favorable	3,500	Pinehill bluestem	30
	Normal	2,500	Indiangrass	10
	Unfavorable	1,500	Longleaf uniola	10
			Panicum	10
			Sedge	10
			Switchgrass	5
			Purpletop	5
			Purple lovegrass	5
Gunter	Favorable	2,000	Pinehill bluestem	15
	Normal	1,500	Longleaf uniola	15
	Unfavorable	1,000	Indiangrass	10
			Purpletop	10
			Panicum	10
			Sand lovegrass	5
			Brownseed paspalum	5
11*	Favorable	1,500	Pinehill bluestem	20
Elmina	Normal	1,250	Longleaf uniola	10
	Unfavorable	500	Purpletop	10
			Panicum	10
			American beautyberry	10
			Indiangrass	5
			Sedge	5
18*:				
Galilee	Favorable	2,500	Pinehill bluestem	25
	Normal	1,800	Longleaf uniola	15
	Unfavorable	1,000	Indiangrass	10
			Panicum	10
			Purpletop	5
Gomery	Favorable	1,500	Pinehill bluestem	20
	Normal	1,250	Longleaf uniola	10
	Unfavorable	500	Purpletop	10
			Panicum	10
			American beautyberry	10
			Indiangrass	5
			Sedge	5
19	Favorable	5,000	Sedge	15
Gladewater	Normal	3,500	Beaked panicum	10
	Unfavorable	1,800	Giant cane	10
			Paspalum	10
			Panicum	10
			Virginia wildrye	5
			Purpletop	5
20*	Favorable	1,500	Pinehill bluestem	20
Gomery	Normal	1,250	Longleaf uniola	10
	Unfavorable	500	Purpletop	10
			Panicum	10
			American beautyberry	10
			Indiangrass	5
			Sedge	5

See footnote at end of table.

TABLE 10.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
21*:				
Gowker	Favorable	3,500	Virginia wildrye	20
	Normal	2,500	Rustyseed paspalum	15
	Unfavorable	2,000	Beaked panicum	10
			Sedge	10
			Panicum	5
			Switchcane	5
Kanebreak	Favorable	3,000	Virginia wildrye	20
	Normal	2,000	Rustyseed paspalum	15
	Unfavorable	1,500	Beaked panicum	10
			Sedge	10
			Switchcane	10
			Panicum	5
			Longleaf uniola	5
22* Gunter	Favorable	2,000	Pinehill bluestem	15
	Normal	1,500	Longleaf uniola	15
	Unfavorable	1,000	Indiangrass	10
			Purpletop	10
			Panicum	10
			Sand lovegrass	5
			Brownseed paspalum	5
25 Kaman	Favorable	4,500	Switchcane	40
	Normal	4,000	Virginia wildrye	10
	Unfavorable	3,000	Hairy panicum	10
26*:				
Kaman	Favorable	4,500	Switchcane	40
	Normal	4,000	Virginia wildrye	10
	Unfavorable	3,000	Hairy panicum	10
Elysian variant.				
27* Kanebreak	Favorable	3,000	Virginia wildrye	20
	Normal	2,000	Rustyseed paspalum	15
	Unfavorable	1,500	Beaked panicum	10
			Sedge	10
			Switchcane	10
			Panicum	5
			Longleaf uniola	5
28 Kaufman	Favorable	6,000	Virginia wildrye	20
	Normal	3,500	Sedge	20
	Unfavorable	1,500	Longleaf uniola	10
			Rustyseed paspalum	10
			Beaked panicum	5
			Switchgrass	5
			Eastern gamagrass	5
			Panicum	5
			Hawthorn	5
			Yaupon	5
29*:				
Kaufman	Favorable	6,000	Virginia wildrye	20
	Normal	3,500	Sedge	20
	Unfavorable	1,500	Longleaf uniola	10
			Rustyseed paspalum	10
			Beaked panicum	5
			Switchgrass	5
			Eastern gamagrass	5
			Panicum	5
			Hawthorn	5
			Yaupon	5

See footnote at end of table.

TABLE 10.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
29*:				
Gowker	Favorable	3,500	Virginia wildrye	20
	Normal	2,500	Rustyseed paspalum	15
	Unfavorable	2,000	Beaked panicum	10
			Sedge	10
			Panicum	5
			Switchcane	5
30	Favorable	1,400	Pinehill bluestem	25
Kershaw	Normal	900	Little bluestem	25
	Unfavorable	700	Slender bluestem	10
			Pineywoods dropseed	7
			Pineland threeawn	5
32*	Favorable	2,000	Pinehill bluestem	20
Landman	Normal	1,500	Panicum	15
	Unfavorable	1,000	Longleaf uniola	15
			Purpletop	10
			American beautyberry	10
			Indiangrass	5
			Sedge	5
34	Favorable	2,000	Longleaf uniola	40
Lufkin	Normal	1,500	Beaked panicum	20
	Unfavorable	1,250	Little bluestem	5
			Indiangrass	5
			Brownseed paspalum	5
			Purpletop	5
35*:				
Lufkin	Favorable	2,000	Longleaf uniola	40
	Normal	1,500	Beaked panicum	20
	Unfavorable	1,250	Little bluestem	5
			Indiangrass	5
			Brownseed paspalum	5
			Purpletop	5
Annona	Favorable	2,500	Little bluestem	15
	Normal	2,000	Brownseed paspalum	15
	Unfavorable	1,000	Panicum	15
			Indiangrass	10
			Longleaf uniola	10
			Purpletop	5
36	Favorable	4,000	Virginia wildrye	15
Moten	Normal	3,000	Pinehill bluestem	10
	Unfavorable	2,000	Beaked panicum	10
			Silver plumegrass	10
			Longleaf uniola	10
			Sedge	10
			Florida paspalum	5
37*	Favorable	---	Pinehill bluestem	30
Nugent	Normal	1,000	Longleaf uniola	30
	Unfavorable	---	Beaked panicum	15
			Panicum	10
			Slender bluestem	5
			Grassleaf goldaster	5
39	Favorable	3,000	Little bluestem	25
Redco	Normal	2,000	Virginia wildrye	15
	Unfavorable	1,500	Rustyseed paspalum	10
			Longleaf uniola	10
			Indiangrass	5
			Sedge	5

See footnote at end of table.

TABLE 10.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
40*:				
Rosenwall	Favorable	2,500	Pinehill bluestem	25
	Normal	1,800	Longleaf uniola	15
	Unfavorable	1,000	Indiangrass	10
			Panicum	10
			Purpletop	5
Goreen	Favorable	2,500	Pinehill bluestem	25
	Normal	1,800	Longleaf uniola	15
	Unfavorable	1,000	Indiangrass	10
			Sedge	10
			Panicum	10
41:				
Trinity	Favorable	6,500	Eastern gamagrass	15
	Normal	4,000	Virginia wildrye	15
	Unfavorable	3,000	Giant cane	10
			Beaked panicum	10
			Sedge	10
			Switchgrass	5
			Indiangrass	5
			Panicum	5
42	Favorable	3,000	Pinehill bluestem	15
Woden	Normal	2,000	Beaked panicum	15
	Unfavorable	1,500	Panicum	15
			Longleaf uniola	10
			Brownseed paspalum	10
			Indiangrass	5
			Purpletop	5
43	Favorable	3,500	Pinehill bluestem	20
Woodtell	Normal	2,500	Panicum	10
	Unfavorable	2,000	Sedge	10
			Brownseed paspalum	10
			Indiangrass	5
			Longleaf uniola	5
			Purpletop	5
			Carolina jointtail	5
			Knotroot bristlegrass	5
			Splitbeard bluestem	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
1*: Annona	Severe: wetness, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength.
Urban land.					
2*, 3* Annona	Severe: wetness, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength.
4, 5 Arol	Severe: wetness, too clayey.	Severe: shrink-swell.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, low strength.
6 Arriola	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
7* Conroe	Severe: wetness, too sandy.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Slight.
8*: Depcor	Moderate: wetness, too sandy.	Slight	Moderate: wetness.	Moderate: slope.	Moderate: low strength.
Urban land.					
9*: Depcor	Moderate: wetness, too sandy.	Slight	Moderate: wetness.	Slight	Moderate: low strength.
Huntsburg	Severe: too clayey, wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell.
10*: Depcor	Moderate: slope, wetness.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope, low strength.
Huntsburg	Severe: too clayey, wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell.
Gunter	Severe: cutbanks cave.	Slight	Moderate: wetness.	Moderate: slope.	Slight.
11* Elmina	Severe: wetness, too sandy.	Moderate: wetness.	Severe: wetness, shrink-swell.	Moderate: wetness.	Moderate: wetness.
12, 13, 14* Falba	Severe: wetness, too clayey.	Severe: shrink-swell.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, low strength.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
15*:					
Falba	Severe: wetness, too clayey.	Severe: shrink-swell.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, low strength.
Arol	Severe: wetness, too clayey.	Severe: shrink-swell.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, low strength.
16, 17* Ferris	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
18*:					
Galilee	Moderate: depth to rock.	Moderate: shrink-swell, slope.	Moderate: depth to rock, shrink-swell.	Severe: slope.	Severe: low strength.
Gomery	Moderate: slope, wetness.	Moderate: slope.	Moderate: slope, wetness.	Severe: slope.	Moderate: wetness, slope.
19 Gladewater	Severe: too clayey.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.
20* Gomery	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope.	Moderate: wetness.
21*:					
Gowker	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Kanebreak	Severe: floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.
22* Gunter	Severe: cutbanks cave.	Slight	Moderate: wetness.	Moderate: slope.	Slight.
23 Houston Black	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
24*:					
Houston Black	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Urban land.					
25 Kaman	Severe: floods, too clayey, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: corrosive, floods, shrink-swell.	Severe: floods, low strength, shrink-swell.
26*:					
Kaman	Severe: floods, too clayey, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: corrosive, floods, shrink-swell.	Severe: floods, low strength, shrink-swell.
Elysian variant	Severe: wetness, too clayey.	Moderate: shrink-swell, low strength.	Severe: wetness, shrink-swell.	Moderate: wetness, shrink-swell, low strength.	Severe: shrink-swell, low strength.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
27*---------- Kanebreak	Severe: floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.
28---------- Kaufman	Severe: too clayey, wetness, floods.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.
29*: Kaufman----------	Severe: too clayey, wetness, floods.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.
Gowker----------	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
30---------- Kershaw	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.
31*: Kitterll---------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.
Rock outcrop.					
32*---------- Landman	Severe: too sandy.	Slight----------	Moderate: wetness.	Slight----------	Slight.
33---------- Leson	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, corrosive.	Severe: shrink-swell.
34---------- Lufkin	Severe: wetness, too clayey.	Severe: shrink-swell, wetness, low strength.	Severe: shrink-swell, wetness, low strength.	Severe: shrink-swell, wetness, low strength.	Severe: shrink-swell, wetness, low strength.
35*: Lufkin----------	Severe: wetness, too clayey.	Severe: shrink-swell, wetness, low strength.	Severe: shrink-swell, wetness, low strength.	Severe: shrink-swell, wetness, low strength.	Severe: shrink-swell, wetness, low strength.
Annona----------	Severe: wetness, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength.
36---------- Moten	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
37*---------- Nugent	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
38*. Pits					
39---------- Redco	Severe: too clayey, cutbanks cave.	Severe: shrink-swell, low strength.	Severe: wetness, shrink-swell.	Severe: shrink-swell, wetness.	Severe: low strength, shrink-swell.
40*: Rosenwall--------	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
40*: Goreen	Severe: wetness, too clayey.	Severe: shrink-swell, wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell.
41* Trinity	Severe: wetness, floods, too clayey.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell.
42 Woden	Slight	Slight	Slight	Slight	Slight.
43 Woodtell	Severe: wetness, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, wetness, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1*:					
Annona	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
Urban land.					
2*, 3* Annona	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
4 Arol	Severe: percs slowly.	Slight	Severe: too clayey, depth to rock.	Severe: wetness.	Poor: thin layer.
5 Arol	Severe: percs slowly.	Moderate: slope.	Severe: too clayey, depth to rock.	Severe: wetness.	Poor: thin layer.
6 Arriola	Severe: percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: too clayey.
7* Conroe	Severe: percs slowly.	Moderate: seepage, slope.	Severe: wetness.	Severe: wetness.	Fair: too sandy.
8*:					
Depcor	Severe: percs slowly, wetness.	Moderate: seepage, slope.	Moderate: wetness.	Slight	Fair: too sandy.
Urban land.					
9*:					
Depcor	Severe: percs slowly, wetness.	Moderate: seepage, slope.	Moderate: wetness.	Slight	Fair: too sandy.
Huntsburg	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Fair: too clayey.
10*:					
Depcor	Severe: percs slowly, wetness.	Severe: slope.	Moderate: wetness.	Moderate: slope.	Fair: slope, too sandy.
Huntsburg	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Fair: too clayey.
Gunter	Moderate: percs slowly.	Severe: seepage.	Moderate: too sandy.	Moderate: seepage.	Fair: too sandy.
11* Elmina	Severe: percs slowly, wetness.	Severe: seepage.	Moderate: depth to rock, wetness.	Moderate: wetness.	Fair: too sandy.
12 Falba	Severe: percs slowly.	Slight	Severe: depth to rock, too clayey.	Severe: wetness.	Poor: thin layer.

See footnotes at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
13, 14* Falba	Severe: percs slowly.	Moderate: slope.	Severe: depth to rock, too clayey.	Severe: wetness.	Poor: thin layer.
15*: Falba	Severe: percs slowly.	Moderate: slope.	Severe: depth to rock, too clayey.	Severe: wetness.	Poor: thin layer.
Arol	Severe: percs slowly.	Moderate: slope.	Severe: too clayey, depth to rock.	Severe: wetness.	Poor: thin layer.
16, 17* Ferris	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
18*: Galilee	Severe: percs slowly.	Severe: slope, depth to rock.	Moderate: depth to rock, too clayey.	Moderate: slope.	Fair: thin layer, too clayey.
Gomery	Severe: percs slowly.	Severe: slope.	Moderate: depth to rock, wetness.	Moderate: slope, wetness.	Fair: slope, too sandy.
19 Gladwater	Severe: percs slowly, floods.	Slight	Severe: floods, too clayey.	Severe: floods.	Poor: too clayey, wetness.
20* Gomery	Severe: percs slowly.	Moderate: wetness, depth to rock.	Moderate: depth to rock, wetness.	Moderate: wetness.	Fair: too sandy.
21*: Gowker	Severe: floods, percs slowly, wetness.	Severe: floods.	Severe: floods.	Severe: floods.	Fair: too clayey.
Kanebreak	Severe: floods, percs slowly, wetness.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
22* Gunther	Moderate: percs slowly.	Severe: seepage.	Moderate: too sandy.	Moderate: seepage.	Fair: too sandy.
23 Houston Black	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
24* Houston Black Urban land.	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
25 Kaman	Severe: floods, percs slowly, wetness.	Moderate: excess humus.	Severe: floods, too clayey, wetness.	Severe: floods, wetness.	Poor: too clayey, wetness.
26*: Kaman	Severe: floods, percs slowly, wetness.	Moderate: excess humus.	Severe: floods, too clayey, wetness.	Severe: floods, wetness.	Poor: too clayey, wetness.

See footnotes at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
26*: Elysian variant	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey, seepage.	Severe: wetness.	Fair: thin layer.
27*: Kanebreak	Severe: floods, percs slowly, wetness.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
28: Kaufman	Severe: percs slowly, floods.	Slight	Severe: floods, too clayey, wetness.	Severe: floods.	Poor: too clayey, wetness.
29*: Kaufman	Severe: percs slowly, floods.	Slight	Severe: floods, too clayey, wetness.	Severe: floods.	Poor: too clayey, wetness.
Gowker	Severe: floods, percs slowly, wetness.	Severe: floods.	Severe: floods.	Severe: floods.	Fair: too clayey.
30: Kershaw	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy.
31*: Kitterll	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
Rock outcrop.					
32*: Landman	Severe: percs slowly, wetness.	Severe: seepage.	Severe: wetness.	Moderate: wetness.	Fair: too sandy.
33: Leson	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
34: Lufkin	Severe: percs slowly.	Slight	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
35*: Lufkin	Severe: percs slowly.	Slight	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
Annona	Severe: percs slowly, wetness.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
36: Moten	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Poor: wetness.
37*: Nugent	Severe: floods, wetness.	Severe: seepage, floods.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Fair: too sandy.
38*: Pits.					

See footnotes at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
39---------- Redco	Severe: percs slowly, wetness.	Slight----------	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
40*: Rosenwall----------	Severe: percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Slight----------	Poor: too clayey.
Goreen----------	Severe: percs slowly, wetness.	Severe: depth to rock.	Severe: too clayey, wetness, depth to rock.	Moderate: wetness.	Poor: thin layer.
41*---------- Trinity	Severe: wetness, floods, percs slowly.	Severe: wetness, floods.	Severe: floods, too clayey, wetness.	Severe: floods, wetness.	Poor: too clayey.
42---------- Woden	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
43---------- Woodtell	Severe: percs slowly, wetness.	----------	Severe: too clayey.	Severe: wetness.	Poor: thin layer.

*See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1*: Annona	Slight	Moderate: unstable fill, compressible.	Percs slowly	Slow intake, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
Urban land.						
2* Annona	Slight	Moderate: unstable fill, compressible.	Percs slowly	Slow intake, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
3* Annona	Slight	Moderate: unstable fill, compressible.	Percs slowly	Slow intake, wetness.	Slope, percs slowly.	Slope.
4, 5 Arol	Slight	Moderate: compressible.	Percs slowly	Slow intake, percs slowly.	Percs slowly, erodes easily.	Droughty, percs slowly.
6 Arriola	Severe: depth to rock.	Moderate: unstable fill, compressible.	Percs slowly	Slow intake	Percs slowly	Percs slowly.
7* Conroe	Slight	Moderate: compressible.	Percs slowly	Fast intake, percs slowly.	Piping, erodes easily.	Erodes easily.
8*: Depcor	Moderate: seepage.	Slight	Not needed	Fast intake	Too sandy	Favorable.
Urban land.						
9*: Depcor	Moderate: seepage.	Slight	Not needed	Fast intake	Too sandy	Favorable.
Huntsburg	Slight	Moderate: low strength.	Percs slowly	Percs slowly	Complex slope, percs slowly.	Percs slowly.
10*: Depcor	Moderate: seepage.	Slight	Not needed	Fast intake, slope.	Too sandy, slope.	Slope.
Huntsburg	Slight	Moderate: low strength.	Percs slowly	Percs slowly	Complex slope, percs slowly.	Percs slowly.
Gunter	Severe: seepage.	Severe: seepage, piping.	Cutbanks cave	Fast intake, droughty.	Too sandy	Droughty.
11* Elmina	Moderate: depth to rock.	Moderate: erodes easily.	Percs slowly, cutbanks cave.	Fast intake	Piping, erodes easily.	Erodes easily.
12, 13, 14* Falba	Slight	Moderate: compressible.	Percs slowly	Slow intake, percs slowly.	Percs slowly, erodes easily.	Droughty, percs slowly.
15*: Falba	Slight	Moderate: compressible.	Percs slowly	Slow intake, percs slowly.	Percs slowly, erodes easily.	Droughty, percs slowly.
Arol	Slight	Moderate: compressible.	Percs slowly	Slow intake, percs slowly.	Percs slowly, erodes easily.	Droughty, percs slowly.
16, 17* Ferris	Slight	Moderate: unstable fill.	Not needed	Percs slowly, slow intake.	Percs slowly, erodes easily.	Percs slowly, erodes easily.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
18*:						
Galilee	Severe: depth to rock.	Moderate: thin layer, compressible.	Not needed	Slope	Slope	Slope.
Gomery	Moderate: depth to rock.	Moderate: thin layer.	Percs slowly, wetness.	Fast intake	Slope, erodes easily.	Erodes easily.
19--- Gladewater	Slight	Moderate: low strength.	Floods, percs slowly, wetness.	Slow intake	Percs slowly	Percs slowly.
20*--- Gomery	Moderate: depth to rock.	Moderate: thin layer.	Percs slowly, wetness.	Fast intake	Piping, erodes easily.	Erodes easily.
21*:						
Gowker	Moderate: seepage.	Moderate: low strength.	Floods	Floods, percs slowly.	Not needed	Not needed.
Kanebreak	Moderate: seepage.	Moderate: piping, erodes easily.	Floods, wetness.	Floods, wetness.	Not needed	Not needed.
22*--- Gunter	Severe: seepage.	Severe: seepage, piping.	Cutbanks cave	Fast intake, droughty.	Too sandy	Droughty.
23--- Houston Black	Slight	Moderate: compressible, unstable fill.	Percs slowly	Slow intake	Percs slowly	Percs slowly.
24*:						
Houston Black	Slight	Moderate: compressible, unstable fill.	Percs slowly	Slow intake	Percs slowly	Percs slowly.
Urban land.						
25--- Kaman	Slight	Moderate: low strength.	Floods	Slow intake, wetness, floods.	Floods, wetness, percs slowly.	Floods, wetness, percs slowly.
26*:						
Kaman	Slight	Moderate: low strength.	Floods	Slow intake, wetness, floods.	Floods, wetness, percs slowly.	Floods, wetness, percs slowly.
Elysian variant	Severe: seepage.	Moderate: unstable fill.	Percs slowly	Percs slowly	Percs slowly	Percs slowly.
27*--- Kanebreak	Moderate: seepage.	Moderate: piping, erodes easily.	Floods, wetness.	Floods, wetness.	Not needed	Not needed.
28--- Kaufman	Slight	Moderate: low strength.	Floods, percs slowly, wetness.	Slow intake	Not needed	Not needed.
29*:						
Kaufman	Slight	Moderate: low strength.	Floods, percs slowly, wetness.	Slow intake	Percs slowly	Percs slowly.
Gowker	Moderate: seepage.	Moderate: low strength.	Floods	Floods, percs slowly.	Not needed	Not needed.
30--- Kershaw	Severe: seepage.	Severe: seepage.	Not needed	Droughty, fast intake.	Too sandy	Droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
31*: Kitterll	Severe: depth to rock.	Severe: thin layer.	Depth to rock	Rooting depth, droughty.	Depth to rock	Droughty, rooting depth.
Rock outcrop.						
32* Landman	Severe: seepage.	Moderate: piping, erodes easily.	Complex slope, cutbanks cave.	Complex slope, fast intake.	Too sandy, piping.	Favorable.
33 Leson	Slight	Moderate: unstable fill, hard to pack.	Percs slowly	Slow intake	Percs slowly	Percs slowly.
34 Lufkin	Slight	Moderate: hard to pack.	Percs slowly	Slow intake, percs slowly.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
35*: Lufkin	Slight	Moderate: hard to pack.	Percs slowly	Slow intake, percs slowly.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Annona	Slight	Moderate: unstable fill, compressible.	Percs slowly	Slow intake, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
36 Moten	Slight	Moderate: erodes easily.	Wetness	Wetness	Wetness	Wetness.
37* Nugent	Severe: seepage.	Moderate: piping, seepage.	Floods	Fast intake, seepage, floods.	Erodes easily	Erodes easily, droughty.
38*. Pits						
39 Redco	Slight	Moderate: unstable fill, low strength.	Percs slowly, cutbanks cave.	Slow intake, percs slowly, wetness.	Wetness, percs slowly.	Wetness, percs slowly.
40*: Rosenwall	Severe: depth to rock.	Moderate: unstable fill, compressible.	Percs slowly	Slow intake	Percs slowly	Percs slowly.
Goreen	Severe: depth to rock.	Moderate: compressible.	Percs slowly	Slow intake, percs slowly.	Percs slowly, erodes easily.	Percs slowly.
41* Trinity	Slight	Moderate: compressible, unstable fill.	Percs slowly, floods.	Percs slowly, floods, wetness.	Floods, wetness, percs slowly.	Floods, wetness, percs slowly.
42 Woden	Severe: seepage.	Moderate: piping, seepage.	Not needed	Complex slope, fast intake.	Favorable	Favorable.
43 Woodtell	Slight	Moderate: unstable fill, compressible, hard to pack.	Percs slowly, slope.	Slow intake, slope.	Slope, erodes easily, wetness.	Percs slowly, slope, erodes easily.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1*: Annona	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Urban land.				
2*, 3* Annona	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
4, 5 Arol	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, area reclaim.
6 Arriola	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
7* Conroe	Poor: low strength.	Poor: thin layer, excess fines.	Poor: thin layer, excess fines.	Poor: too sandy.
8*: Depcor	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Urban land.				
9*: Depcor	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Huntsburg	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too sandy.
10*: Depcor	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Huntsburg	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Gunter	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
11* Elmina	Fair: wetness.	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
12, 13, 14* Falba	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: area reclaim, thin layer.
15*: Falba	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: area reclaim, thin layer.
Arol	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, area reclaim.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
16, 17*--- Ferris	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
18*: Galilee---	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Gomery---	Fair: wetness.	Poor: excess fines, thin layer.	Unsuited: excess fines.	Poor: too sandy.
19--- Gladewater	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
20*--- Gomery	Fair: wetness.	Poor: excess fines, thin layer.	Unsuited: excess fines.	Poor: too sandy.
21*: Gowker---	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Kanebreak---	Fair: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
22*--- Gunter	Good---	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
23--- Houston Black	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
24*: Houston Black---	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Urban land.				
25--- Kaman	Poor: low strength, shrink-swell, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, wetness.
26*: Kaman---	Poor: low strength, shrink-swell, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, wetness.
Elysian variant---	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
27*--- Kanebreak	Fair: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
28--- Kaufman	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
29*: Kaufman---	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Gowker---	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
30--Kershaw	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
31*: Kitterll	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, area reclaim.
Rock outcrop.				
32*--Landman	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
33--Leson	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
34--Lufkin	Poor: shrink-swell, low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, wetness.
35*: Lufkin	Poor: shrink-swell, low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, wetness.
Annona	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
36--Moten	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
37*--Nugent	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
38*. Pits				
39--Redco	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
40*: Rosenwall	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Goreen	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
41*--Trinity	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
42--Woden	Good	Unsuited: excess fines.	Unsuited: excess fines.	Good.
43--Woodtell	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1*:											
Annona	0-4	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0	95-100	95-100	75-95	45-70	<30	NP-7
	4-44	Clay, clay loam	CH	A-7	0	95-100	95-100	90-100	75-95	51-70	30-45
	44-80	Clay, clay loam	CH, CL	A-7	0	95-100	95-100	90-100	75-95	41-55	25-35
Urban land.											
2*, 3* Annona	0-4	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0	95-100	95-100	75-95	45-70	<30	NP-7
	4-44	Clay, clay loam	CH	A-7	0	95-100	95-100	90-100	75-95	51-70	30-45
	44-80	Clay, clay loam	CH, CL	A-7	0	95-100	95-100	90-100	75-95	41-55	25-35
4, 5 Arol	0-6	Fine sandy loam	SM-SC, SM, CL-ML, ML	A-4	0	98-100	95-100	70-98	40-65	<20	NP-7
	6-30	Clay, clay loam	CH	A-7	0	98-100	95-100	90-100	70-95	51-70	34-48
	30-45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
6 Arriola	0-9	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0	95-100	95-100	75-95	45-70	<30	NP-7
	9-38	Clay	CL, CH, MH	A-7	0	95-100	95-100	90-100	75-95	43-60	18-30
	38-50	Weathered bedrock.	---	---	---	---	---	---	---	---	---
7* Conroe	0-28	Loamy fine sand	SM, SM-SC	A-2-4, A-4	0	80-100	80-98	45-80	15-50	<25	NP-4
	28-33	Sandy clay loam, sandy clay, clay loam.	SC, CL	A-2-6, A-2-7, A-6, A-7	0	65-95	65-95	50-90	25-60	30-45	12-25
	33-70	Sandy clay, clay	CL, SC, CH	A-7-6, A-6	0	80-100	75-100	60-95	35-60	40-55	20-35
8*:											
Depcor	0-26	Loamy fine sand	SM, SM-SC	A-2-4, A-4	0	90-100	90-100	50-95	15-45	<25	NP-4
	26-65	Sandy clay loam, clay loam.	SC, CL	A-4, A-6	0	90-100	90-100	80-100	36-75	25-39	8-16
	65-80	Fine sandy loam, sandy clay loam, sandy clay.	SC, CL, SM-SC, CL-ML	A-4, A-6, A-7	0	95-100	90-100	80-95	36-60	20-43	5-18
Urban land.											
9*:											
Depcor	0-26	Loamy fine sand	SM, SM-SC	A-2-4, A-4	0	90-100	90-100	50-95	15-45	<25	NP-4
	26-65	Sandy clay loam, clay loam.	SC, CL	A-4, A-6	0	90-100	90-100	80-100	36-75	25-39	8-16
	65-80	Fine sandy loam, sandy clay loam, sandy clay.	SC, CL, SM-SC, CL-ML	A-4, A-6, A-7	0	95-100	90-100	80-95	36-60	20-43	5-18

See footnote at end of table.

TABLE 15.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
9*:											
Huntsburg	0-14	Loamy fine sand	SM, SM-SC	A-2-4, A-4	0	90-100	85-100	50-95	15-45	<25	NP-4
	14-22	Sandy clay, clay	CL, CH, SC	A-7	0	90-100	90-100	70-100	36-90	44-55	22-30
	22-72	Clay, sandy clay	CL, CH, SC	A-7	0	90-100	90-100	70-100	36-90	48-62	25-36
10*:											
Depcor	0-26	Loamy fine sand	SM, SM-SC	A-2-4, A-4	0	90-100	90-100	50-95	15-45	<25	NP-4
	26-65	Sandy clay loam, clay loam.	SC, CL	A-4, A-6	0	90-100	90-100	80-100	36-75	25-39	8-16
	65-80	Fine sandy loam, sandy clay loam, sandy clay.	SC, CL, SM-SC, CL-ML	A-4, A-6, A-7	0	95-100	90-100	80-95	36-60	20-43	5-18
Huntsburg	0-14	Loamy fine sand	SM, SM-SC	A-2-4, A-4	0	90-100	85-100	50-95	15-45	<25	NP-4
	14-22	Sandy clay, clay	CL, CH, SC	A-7	0	90-100	90-100	70-100	36-90	44-55	22-30
	22-72	Clay, sandy clay	CL, CH, SC	A-7	0	90-100	90-100	70-100	36-90	48-62	25-36
Gunter	0-48	Loamy sand	SM, SM-SC, SP-SM	A-2-4	0	95-100	95-100	65-90	10-35	<25	NP-5
	48-60	Loamy fine sand, fine sandy loam, sandy loam.	SM, SM-SC	A-2-4, A-4	0	95-100	95-100	70-95	20-50	<30	NP-7
	60-75	Sandy clay loam, fine sandy loam, sandy loam.	SC	A-2-4, A-2-6, A-4, A-6	0	90-100	90-100	70-95	25-50	20-35	8-20
11*---------- Elmina	0-32	Loamy fine sand	SM, SM-SC	A-2-4, A-4	0	95-100	95-100	60-95	15-40	<25	NP-4
	32-40	Clay, sandy clay	CH	A-7-6	0	95-100	95-100	85-100	51-95	51-65	27-40
	40-52	Clay, sandy clay, sandy clay loam.	CH, CL, SC	A-7-6, A-6	0	95-100	95-100	85-100	40-95	40-65	25-40
	52-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
12, 13, 14*-------- Falba	0-7	Fine sandy loam	SM-SC, SM, CL-ML, ML	A-4	0	98-100	95-100	70-98	40-60	<20	NP-7
	7-24	Clay, clay loam	CH	A-7	0	98-100	95-100	90-100	75-95	51-70	34-48
	24-33	Sandy clay loam, clay loam, clay.	CH, CL	A-6, A-7	0	98-100	95-100	80-100	51-95	34-70	21-48
	33-55	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
15*:											
Falba	0-7	Fine sandy loam	SM-SC, SM, CL-ML, ML	A-4	0	98-100	95-100	70-98	40-60	<20	NP-7
	7-24	Clay, clay loam	CH	A-7	0	98-100	95-100	90-100	75-95	51-70	34-48
	24-33	Sandy clay loam, clay loam, clay.	CH, CL	A-6, A-7	0	98-100	95-100	80-100	51-95	34-70	21-48
	33-55	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
15*:											
Arol	0-6	Fine sandy loam	SM-SC, SM, CL-ML, ML	A-4	0	98-100	95-100	70-98	40-65	<20	NP-7
	6-30	Clay, clay loam	CH	A-7	0	98-100	95-100	90-100	70-95	51-70	34-48
	30-45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
16, 17* Ferris	0-70	Clay	CH	A-7-6	0	95-100	95-100	75-100	75-98	51-70	35-50
18*:											
Galilee	0-8	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0	95-100	95-100	75-95	45-70	<30	NP-7
	8-26	Clay, clay loam	CL, CH	A-6, A-7-6	0	95-100	95-100	85-100	70-95	39-52	16-23
	26-38	Sandy clay loam, clay loam, clay.	CL, SC	A-6, A-7-6	0	95-100	95-100	80-100	45-95	30-50	11-22
	38-50	Stratified weathered bedrock to shaly clay.	---	---	---	---	---	---	---	---	---
Gomery	0-26	Loamy fine sand	SM, SM-SC	A-2-4, A-4	0	95-100	95-100	60-95	15-40	<25	NP-4
	26-47	Sandy clay loam, clay loam.	CL, SC	A-6, A-7	0	95-100	95-100	75-100	35-75	30-44	11-25
	47-54	Sandy clay loam, sandy clay.	CL, SC	A-6, A-7	0	95-100	95-100	75-100	35-75	30-50	11-30
	54-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
19 Gladewater	0-6	Clay	CH, CL	A-7	0	100	100	90-100	80-95	48-75	25-50
	6-65	Clay, silty clay	CH	A-7	0	100	100	95-100	90-100	51-75	30-50
20* Gomery	0-26	Loamy fine sand	SM, SM-SC	A-2-4, A-4	0	95-100	95-100	60-95	15-40	<25	NP-4
	26-47	Sandy clay loam, clay loam.	CL, SC	A-6, A-7	0	95-100	95-100	75-100	35-75	30-44	11-25
	47-54	Sandy clay loam, sandy clay.	CL, SC	A-6, A-7	0	95-100	95-100	75-100	35-75	30-50	11-30
	54-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
21*:											
Gowker	0-30	Clay loam	CL, SC	A-6	0	95-100	95-100	85-100	40-80	30-40	11-18
	30-44	Clay, clay loam, sandy clay.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	70-95	38-48	15-21
	44-60	Clay, sandy clay loam, clay loam.	CL, SC	A-6, A-7	0	95-100	95-100	80-100	40-90	30-48	11-21
Kanebreak	0-8	Fine sandy loam	CL-ML, SC, SM-SC	A-4	0	98-100	98-100	70-85	40-55	<25	NP-7
	8-28	Fine sandy loam, sandy clay loam, clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0	98-100	98-100	75-100	40-75	23-38	7-18
	28-70	Stratified fine sandy loam to clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0	98-100	98-100	70-95	40-70	23-38	7-18

See footnote at end of table.

TABLE 15.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
22*---------- Gunter	0-48	Loamy sand------	SM, SM-SC, SP-SM	A-2-4	0	95-100	95-100	65-90	10-35	<25	NP-5
	48-60	Loamy fine sand, fine sandy loam, sandy loam.	SM, SM-SC	A-2-4, A-4	0	95-100	95-100	70-95	20-50	<30	NP-7
	60-75	Sandy clay loam, fine sandy loam, sandy loam.	SC	A-2-4, A-2-6, A-4, A-6	0	90-100	90-100	70-95	25-50	20-35	8-20
23---------- Houston Black	0-65	Clay----------	CH	A-7-6	0	95-100	95-100	95-100	85-100	58-90	34-65
24*: Houston Black-----	0-65	Clay----------	CH	A-7-6	0	95-100	95-100	95-100	85-100	58-90	34-65
Urban land.											
25---------- Kaman	0-65	Clay----------	CH, CL	A-7	0	98-100	98-100	90-100	75-90	46-66	24-42
26*: Kaman----------	0-65	Clay----------	CH, CL	A-7	0	98-100	98-100	90-100	75-90	46-66	24-42
Elysian variant---	0-29	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0	95-100	95-100	75-95	45-70	<30	NP-7
	29-36	Sandy clay loam	CL, SC	A-4, A-6	0	95-100	95-100	80-100	36-55	25-40	10-25
	36-66	Clay----------	CL, CH	A-7-6	0	95-100	95-100	90-100	75-95	43-60	18-35
	66-80	Loamy sand------	SM, SM-SC	A-2-4	0	95-100	95-100	85-100	14-35	<30	NP-7
27*---------- Kanebreak	0-8	Fine sandy loam	CL-ML, SC, SM-SC	A-4	0	98-100	98-100	70-85	40-55	<25	NP-7
	8-28	Fine sandy loam, sandy clay loam, clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0	98-100	98-100	75-100	40-75	23-38	7-18
	28-70	Stratified fine sandy loam to clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0	98-100	98-100	70-95	40-70	23-38	7-18
28---------- Kaufman	0-7	Clay----------	CH	A-7	0	100	100	90-100	80-95	56-75	33-49
	7-65	Clay----------	CH	A-7	0	100	100	95-100	90-100	76-96	49-70
29*: Kaufman----------	0-7	Clay----------	CH	A-7	0	100	100	90-100	80-95	56-75	33-49
	7-65	Clay----------	CH	A-7	0	100	100	95-100	90-100	76-96	49-70
Gowker----------	0-30	Clay loam-------	CL, SC	A-6	0	95-100	95-100	85-100	40-80	30-40	11-18
	30-44	Clay, clay loam, sandy clay.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	70-95	38-48	15-21
	44-60	Clay, sandy clay loam, clay loam.	CL, SC	A-6, A-7	0	95-100	95-100	80-100	40-90	30-48	11-21
30---------- Kershaw	0-80	Sand----------	SP, SP-SM	A-2, A-3	0	98-100	98-100	50-80	1-7	---	NP
31*: Kitterll----------	0-6	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4	0	90-100	90-100	60-90	36-65	<25	NP-7
	6-8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 15.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticit index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
32*---------- Landman	0-74	Loamy fine sand	SM, SM-SC	A-2-4	0	95-100	95-100	85-100	14-35	<25	NP-7
	74-80	Sandy clay loam, fine sandy loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0	95-100	90-100	80-100	36-55	23-40	6-20
33---------- Leson	0-60	Clay----------	CH	A-7-6	0	98-100	90-100	90-100	90-100	60-90	35-60
34---------- Lufkin	0-9	Fine sandy loam	SM, CL, CL-ML, SM-SC	A-4	0-5	90-100	80-100	80-100	40-85	<30	NP-10
	9-55	Clay, clay loam, silty clay loam.	CH	A-7-6	0	90-100	90-100	90-100	70-95	51-67	30-45
	55-75	Clay, clay loam, sandy clay loam.	CH, CL, SC	A-7	0	70-100	70-100	55-100	44-90	45-86	25-55
35*:											
Lufkin----------	0-9	Fine sandy loam	SM, CL, CL-ML, SM-SC	A-4	0-5	90-100	80-100	80-100	40-85	<30	NP-10
	9-55	Clay, clay loam, silty clay loam.	CH	A-7-6	0	90-100	90-100	90-100	70-95	51-67	30-45
	55-75	Clay, clay loam, sandy clay loam.	CH, CL, SC	A-7	0	70-100	70-100	55-100	44-90	45-86	25-55
Annona----------	0-4	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0	95-100	95-100	75-95	45-70	<30	NP-7
	4-44	Clay, clay loam	CH	A-7	0	95-100	95-100	90-100	75-95	51-70	30-45
	44-80	Clay, clay loam	CH, CL	A-7	0	95-100	95-100	90-100	75-95	41-55	25-35
36---------- Moten	0-21	Fine sandy loam	CL-ML, ML, SM, SM-SC	A-4	0	98-100	98-100	95-100	40-65	<20	NP-7
	21-36	Fine sandy loam, very fine sandy loam, loam.	CL-ML, ML, SM, SM-SC	A-4	0	98-100	98-100	95-100	40-75	<20	NP-7
	36-46	Sandy clay loam, fine sandy loam, loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0	98-100	98-100	85-100	40-75	18-30	4-12
	46-75	Clay, sandy clay loam, fine sandy loam.	CL-ML, CL, SC, SM-SC	A-4, A-6, A-7	0	98-100	98-100	85-100	40-85	20-45	5-20
37*---------- Nugent	0-10	Loamy sand------	SM, SP-SM	A-2	0	85-100	75-100	50-100	10-30	---	NP
	10-75	Stratified loamy sand to fine sandy loam.	SM, SP-SM	A-2	0	85-100	75-100	60-100	10-30	<25	NP-3
38*. Pits											
39---------- Redco	0-7	Clay----------	CH	A-7-6	0	98-100	90-100	85-100	65-95	75-90	48-60
	7-40	Clay----------	CH	A-7-6	0	98-100	90-100	85-100	65-95	75-90	48-60
	40-72	Clay----------	CH	A-7-6	0	98-100	90-100	85-100	65-95	75-90	48-60
40*:											
Rosenwall---------	0-6	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0	95-100	95-100	75-95	45-70	<30	NP-7
	6-27	Clay----------	MH, CH	A-7	0	95-100	95-100	90-100	75-95	60-75	28-39
	27-30	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
40*:											
Goreen	0-13	Fine sandy loam	SM, SM-SC, CL-ML, ML	A-4	0	98-100	98-100	65-85	38-55	<20	NP-7
	13-31	Clay	CL, CH, MH	A-7-5, A-7-6	0	98-100	98-100	90-100	75-95	43-60	18-28
	31-40	Stratified weathered bedrock to shaly clay.	---	---	---	---	---	---	---	---	---
41* Trinity	0-60	Clay	CH	A-7	0	100	98-100	85-100	80-95	41-60	20-40
42 Woden	0-20	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4	0	98-100	98-100	70-85	40-65	<23	NP-7
	20-80	Fine sandy loam, loam.	SM, ML, CL-ML, SM-SC	A-4	0	98-100	98-100	70-85	40-65	<23	NP-7
43 Woodtell	0-7	Fine sandy loam	SM, SM-SC, CL-ML, ML	A-2-4, A-4	0	90-100	85-100	75-95	30-60	<25	NP-7
	7-32	Clay, silty clay	CH	A-7-6	0	100	90-100	80-100	60-98	51-75	28-50
	32-58	Clay loam, clay, sandy clay loam.	CL, SC, CH	A-6, A-7-6	0	100	80-100	75-90	36-98	35-65	15-45
	58-80	Weathered bedrock.	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
1*:				
Annona	Severe: percs slowly, wetness.	Moderate: wetness.	Severe: percs slowly, wetness.	Moderate: wetness.
Urban land.				
2*, 3* Annona	Severe: percs slowly.	Moderate: wetness.	Severe: percs slowly, wetness.	Moderate: wetness.
4, 5 Arol	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.
6 Arriola	Severe: percs slowly.	Slight	Severe: percs slowly.	Slight.
7* Conroe	Moderate: too sandy, percs slowly.	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.
8*:				
Depcor	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
Urban land.				
9*:				
Depcor	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
Huntsburg	Severe: percs slowly, wetness.	Moderate: too sandy.	Severe: percs slowly, wetness.	Moderate: too sandy.
10*:				
Depcor	Moderate: too sandy, slope.	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy.
Huntsburg	Severe: percs slowly, wetness.	Moderate: too sandy.	Severe: percs slowly, slope.	Moderate: too sandy.
Gunter	Moderate: too sandy.	Moderate: too sandy.	Severe: slope.	Moderate: too sandy.
11* Elmina	Moderate: too sandy, percs slowly.	Moderate: too sandy.	Moderate: too sandy, percs slowly.	Moderate: too sandy.
12, 13, 14* Falba	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.
15*:				
Falba	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.
Arol	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.

See footnote at end of table.

TABLE 16.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
16, 17*---------- Ferris	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey.
18*: Galilee----------	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight.
Gomery----------	Moderate: slope, too sandy.	Moderate: too sandy.	Severe: slope.	Moderate: too sandy.
19---------- Gladewater	Severe: floods, too clayey.	Severe: floods, too clayey.	Severe: floods, too clayey.	Severe: too clayey.
20*---------- Gomery	Moderate: too sandy, percs slowly.	Moderate: too sandy.	Moderate: too sandy, percs slowly.	Moderate: too sandy.
21*: Gowker----------	Severe: floods.	Moderate: floods, too clayey.	Severe: floods.	Moderate: floods, too clayey.
Kanebreak----------	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Moderate: floods, wetness.
22*---------- Gunter	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
23---------- Houston Black	Severe: percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
24*: Houston Black--------	Severe: percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
Urban land.				
25---------- Kaman	Severe: floods, too clayey, wetness.	Severe: floods, too clayey, wetness.	Severe: floods, too clayey, wetness.	Severe: floods, too clayey, wetness.
26*: Kaman----------	Severe: floods, too clayey, wetness.	Severe: floods, too clayey, wetness.	Severe: floods, too clayey, wetness.	Severe: floods, too clayey, wetness.
Elysian variant------	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: percs slowly, wetness.	Slight.
27*---------- Kanebreak	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Moderate: floods, wetness.
28---------- Kaufman	Severe: floods, too clayey, wetness.	Severe: floods, too clayey, wetness.	Severe: floods, too clayey, wetness.	Severe: too clayey, floods, wetness.

See footnote at end of table.

TABLE 16.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
29*:				
Kaufman	Severe: floods, too clayey, wetness.	Severe: floods, too clayey, wetness.	Severe: floods, too clayey, wetness.	Severe: too clayey, floods, wetness.
Gowker	Severe: floods.	Moderate: floods, too clayey.	Severe: floods.	Moderate: floods, too clayey.
30 Kershaw	Severe: too sandy.	Severe: too sandy.	Severe: too sandy, slope.	Severe: too sandy.
31*:				
Kitterll	Severe: depth to rock.	Slight	Severe: depth to rock.	Slight.
Rock outcrop.				
32* Landman	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
33 Leson	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey.
34 Lufkin	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.
35*:				
Lufkin	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.
Annona	Severe: percs slowly, wetness.	Moderate: wetness.	Severe: percs slowly, wetness.	Moderate: wetness.
36 Moten	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
37* Nugent	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
38*. Pits				
39 Redco	Severe: wetness, percs slowly.	Severe: wetness, too clayey.	Severe: wetness, percs slowly.	Severe: wetness, too clayey.
40*:				
Rosenwall	Severe: percs slowly.	Slight	Severe: percs slowly.	Slight.
Goreen	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.
41* Trinity	Severe: wetness, floods, percs slowly.	Severe: floods, too clayey.	Severe: wetness, floods, percs slowly.	Severe: floods, too clayey.
42 Woden	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 16.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
43---------- Woodtell	Severe: slope, percs slowly.	Moderate: wetness.	Severe: percs slowly.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
1*: Annona	Fair	Fair	Good	Good	Good	---	Poor	Very poor.	Fair	Good	Very poor.	---
Urban land.												
2*: Annona	Fair	Fair	Good	Good	Good	---	Poor	Very poor.	Fair	Good	Very poor.	---
3*: Annona	Fair	Fair	Good	Good	Good	---	Poor	Very poor.	Fair	Good	Very poor.	---
4: Arol	Fair	Good	Fair	Good	---	Good	Fair	Fair	Fair	Fair	Fair	---
5: Arol	Fair	Good	Fair	Good	---	Good	Poor	Poor	Fair	Fair	Poor	Fair.
6: Arriola	Fair	Good	Good	Fair	Fair	---	Poor	Very poor.	Good	Fair	Poor	---
7*: Conroe	Poor	Fair	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Good	Very poor.	---
8*: Depcor	Poor	Fair	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.	---
Urban land.												
9*: Depcor	Poor	Fair	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.	---
Huntsburg	Poor	Fair	Good	Good	Good	---	Poor	Very poor.	Fair	Good	Very poor.	---
10*: Depcor	Poor	Fair	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.	---
Huntsburg	Poor	Fair	Good	Good	Good	---	Poor	Very poor.	Fair	Good	Very poor.	---
Gunter	Fair	Fair	Fair	Poor	Poor	---	Very poor.	Very poor.	Fair	Poor	Very poor.	---
11*: Elmina	Poor	Fair	Good	Fair	Fair	---	Poor	Poor	Fair	Fair	Poor	---
12: Falba	Fair	Good	Fair	Good	---	Good	Fair	Fair	Fair	Fair	Fair	Fair.
13: Falba	Fair	Good	Fair	Good	---	Good	Poor	Poor	Fair	Fair	Poor	Fair.
14*: Falba	Fair	Good	Fair	Good	---	Good	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
15*: Falba	Fair	Good	Fair	Good	---	Good	Poor	Poor	Fair	Fair	Poor	Fair.
Arol	Fair	Good	Fair	Good	---	Good	Poor	Poor	Fair	Fair	Poor	Fair.

See footnote at end of table.

TABLE 17.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
16---------- Ferris	Fair	Good	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
17*---------- Ferris	Poor	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
18*: Galilee----------	Fair	Good	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.	---
Gomery----------	Fair	Fair	Good	Fair	Fair	---	Poor	Poor	Fair	Fair	Poor	---
19---------- Gladewater	Poor	Fair	Fair	Fair	---	---	Poor	Good	Fair	Fair	Fair	---
20*---------- Gomery	Fair	Fair	Good	Fair	Fair	---	Poor	Poor	Fair	Fair	Poor	---
21*: Gowker----------	Poor	Fair	Fair	Good	---	---	Poor	Poor	Fair	Good	Poor	---
Kanebreak---------	Poor	Fair	Fair	Good	Good	---	Good	Good	Fair	Good	Good	---
22*---------- Gunter	Fair	Fair	Fair	Poor	Poor	---	Very poor.	Very poor.	Fair	Poor	Very poor.	---
23---------- Houston Black	Good	Good	Poor	---	---	Fair	Poor	Poor	Fair	---	Poor	Fair.
24*: Houston Black-----	Good	Good	Poor	---	---	Fair	Poor	Poor	Fair	---	Poor	Fair.
Urban land.												
25---------- Kaman	Fair	Fair	Fair	Fair	Poor	---	Poor	Good	Fair	Fair	Fair	---
26*: Kaman----------	Fair	Fair	Fair	Fair	Poor	---	Poor	Good	Fair	Fair	Fair	---
Elysian variant---	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
27*---------- Kanebreak	Poor	Fair	Fair	Good	Good	---	Good	Good	Fair	Good	Good	---
28---------- Kaufman	Fair	Fair	Fair	Good	---	Fair	Poor	Fair	Fair	Good	Fair	---
29*: Kaufman----------	Poor	Poor	Fair	Good	---	Fair	Poor	Good	Poor	Good	Fair	---
Gowker----------	Poor	Fair	Fair	Good	---	---	Poor	Poor	Fair	Good	Poor	---
30---------- Kershaw	Very poor.	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Very poor.	Poor	Very poor.	Very poor.	---
31*: Kitterll----------	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	---
Rock outcrop.												
32*---------- Landman	Poor	Fair	Fair	Fair	Fair	---	Poor	Poor	Fair	Fair	Poor	---
33---------- Leson	Good	Good	Poor	---	---	Poor	Very poor.	Very poor.	Fair	---	Very poor.	Poor.

See footnote at end of table.

TABLE 17.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
34---- Lufkin	Fair	Good	Good	Good	Good	Good	Fair	Fair	Fair	Good	Fair	---
35*:												
Lufkin----	Fair	Good	Good	Good	Good	Good	Fair	Fair	Fair	Good	Fair	---
Annona----	Fair	Fair	Good	Good	Good	---	Fair	Fair	Fair	Good	Fair	---
36---- Moten	Poor	Fair	Fair	Fair	Fair	---	Good	Good	Fair	Fair	Good	---
37*---- Nugent	Poor	Poor	Fair	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.	---
38*. Pits												
39---- Redco	Poor	Fair	Fair	Fair	Fair	---	Poor	Fair	Fair	Fair	Poor	---
40*:												
Rosenwall----	Fair	Good	Good	Fair	Fair	---	Poor	Very poor.	Good	Fair	Poor	---
Goreen----	Fair	Good	Fair	Good	Good	---	Poor	Very poor.	Fair	Good	Very poor.	---
41*---- Trinity	Poor	Fair	Fair	Good	---	---	Poor	Fair	Fair	Fair	Poor	---
42---- Woden	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
43---- Woodtell	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Poor	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
1*:							
Annona----------	0-4	0.6-2.0	0.13-0.18	4.5-6.5	Low----------	0.43	5
	4-44	<0.06	0.12-0.18	4.5-6.0	High----------	0.32	
	44-80	<0.06	0.12-0.18	5.6-8.4	High----------	0.28	
Urban land.							
2*, 3*----------	0-4	0.6-2.0	0.13-0.18	4.5-6.5	Low----------	0.43	5
Annona	4-44	<0.06	0.12-0.18	4.5-6.0	High----------	0.32	
	44-80	<0.06	0.12-0.18	5.6-8.4	High----------	0.28	
4, 5----------	0-6	0.6-2.0	0.11-0.17	5.1-6.0	Low----------	0.43	3
Arol	6-30	<0.06	0.14-0.18	5.1-7.8	High----------	0.32	
	30-45	---	---	---	----------	---	
6----------	0-9	2.0-6.0	0.11-0.15	4.5-6.5	Low----------	0.43	2
Arriola	9-38	<0.06	0.12-0.18	4.5-5.5	High----------	0.32	
	38-50	---	---	---	----------	---	
7*----------	0-28	2.0-6.0	0.07-0.11	4.5-6.5	Very low-------	0.24	5
Conroe	28-33	0.06-0.2	0.10-0.20	4.5-5.5	Low----------	0.20	
	33-70	0.06-0.2	0.10-0.16	4.5-5.5	Low----------	0.17	
8*:							
Depcor----------	0-26	6.0-20	0.06-0.11	4.5-6.5	Very low-------	0.17	5
	26-65	0.06-0.2	0.10-0.15	4.5-6.5	Low----------	0.24	
	65-80	0.2-0.6	0.10-0.15	4.5-6.0	Low----------	0.24	
Urban land.							
9*:							
Depcor----------	0-26	6.0-20	0.06-0.11	4.5-6.5	Very low-------	0.17	5
	26-65	0.06-0.2	0.10-0.15	4.5-6.5	Low----------	0.24	
	65-80	0.2-0.6	0.10-0.15	4.5-6.0	Low----------	0.24	
Huntsburg-------	0-14	6.0-20	0.06-0.11	5.6-6.5	Very low-------	0.28	5
	14-22	0.06-0.2	0.10-0.15	4.5-5.5	Moderate-------	0.32	
	22-72	<0.06	0.10-0.18	4.5-5.5	High----------	0.32	
10*:							
Depcor----------	0-26	6.0-20	0.06-0.11	4.5-6.5	Very low-------	0.17	5
	26-65	0.06-0.2	0.10-0.15	4.5-6.5	Low----------	0.24	
	65-80	0.2-0.6	0.10-0.15	4.5-6.0	Low----------	0.24	
Huntsburg-------	0-14	6.0-20	0.06-0.11	5.6-6.5	Very low-------	0.28	5
	14-22	0.06-0.2	0.10-0.15	4.5-5.5	Moderate-------	0.32	
	22-72	<0.06	0.10-0.18	4.5-5.5	High----------	0.32	
Gunter----------	0-48	6.0-20	0.05-0.10	4.5-6.5	Low----------	0.17	5
	48-60	6.0-20	0.08-0.12	4.5-6.0	Low----------	0.24	
	60-75	0.2-0.6	0.10-0.15	4.5-6.0	Low----------	0.24	
11*----------	0-32	6.0-20.0	0.05-0.10	4.5-6.5	Very low-------	0.28	3
Elmina	32-40	<0.06	0.10-0.15	4.1-6.0	High----------	0.32	
	40-52	<0.06	0.10-0.15	4.1-6.0	High----------	0.37	
	52-60	---	---	---	----------	---	
12, 13, 14*------	0-7	0.6-2.0	0.11-0.15	5.1-6.0	Low----------	0.43	2
Falba	7-24	<0.06	0.14-0.18	4.5-5.5	High----------	0.32	
	24-33	<0.06	0.14-0.18	4.5-5.5	High----------	0.32	
	33-55	---	---	---	----------	---	

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/In	pH			
15*:							
Falba	0-7	0.6-2.0	0.11-0.15	5.1-6.0	Low	0.43	2
	7-24	<0.06	0.14-0.18	4.5-5.5	High	0.32	
	24-33	<0.06	0.14-0.18	4.5-5.5	High	0.32	
	33-55	---	---	---	---	---	
Arol	0-6	0.6-2.0	0.11-0.17	5.1-6.0	Low	0.43	3
	6-30	<0.06	0.14-0.18	5.1-7.8	High	0.32	
	30-45	---	---	---	---	---	
16, 17* Ferris	0-70	<0.06	0.15-0.18	7.9-8.4	Very high	0.32	4
18*:							
Galilee	0-8	2.0-6.0	0.11-0.15	4.5-6.5	Low	0.32	3
	8-26	0.06-0.2	0.12-0.18	4.5-6.0	Moderate	0.32	
	26-38	0.2-0.6	0.12-0.18	4.5-6.0	Moderate	0.32	
	38-50	---	---	---	---	---	
Gomery	0-26	6.0-20	0.07-0.11	4.5-6.5	Very low	0.17	4
	26-47	0.2-0.6	0.12-0.17	4.5-6.0	Low	0.24	
	47-54	0.2-0.6	0.12-0.17	4.5-6.0	Low	0.24	
	54-60	---	---	---	---	---	
19 Gladewater	0-6	0.06-0.2	0.15-0.20	5.6-7.3	High	0.32	5
	6-65	<0.06	0.15-0.18	4.5-7.3	High	0.32	
20* Gomery	0-26	6.0-20	0.07-0.11	4.5-6.5	Very low	0.17	4
	26-47	0.2-0.6	0.12-0.17	4.5-6.0	Low	0.24	
	47-54	0.2-0.6	0.12-0.17	4.5-6.0	Low	0.24	
	54-60	---	---	---	---	---	
21*:							
Gowker	0-30	0.6-2.0	0.12-0.20	5.6-6.5	Moderate	0.32	5
	30-44	0.06-0.2	0.12-0.20	5.6-7.3	Moderate	0.37	
	44-60	0.2-0.6	0.12-0.20	5.6-8.4	Moderate	0.37	
Kanebreak	0-8	0.6-2.0	0.11-0.15	5.6-7.3	Low	0.28	5
	8-28	0.06-0.2	0.11-0.17	6.1-7.8	Low	0.28	
	28-70	0.6-2.0	0.11-0.17	6.1-8.4	Low	0.28	
22* Gunter	0-48	6.0-20	0.05-0.10	4.5-6.5	Low	0.17	5
	48-60	6.0-20	0.08-0.12	4.5-6.0	Low	0.24	
	60-75	0.2-0.6	0.10-0.15	4.5-6.0	Low	0.24	
23 Houston Black	0-65	<0.06	0.15-0.20	7.4-8.4	Very high	0.32	5
24*:							
Houston Black	0-65	<0.06	0.15-0.20	7.4-8.4	Very high	0.32	5
Urban land.							
25 Kaman	0-65	<0.06	0.15-0.20	5.6-7.8	High	0.32	5
26*:							
Kaman	0-65	<0.06	0.15-0.20	5.6-7.8	High	0.32	5
Elysian variant	0-29	2.0-6.0	0.10-0.15	5.1-6.5	Low	0.17	5
	29-36	0.6-2.0	0.15-0.20	5.1-7.3	Moderate	0.24	
	36-66	0.06-0.2	0.12-0.18	5.1-7.3	High	0.32	
	66-80	6.0-20	0.05-0.10	6.1-7.3	Low	0.17	
27* Kanebreak	0-8	0.6-2.0	0.11-0.15	5.6-7.3	Low	0.28	5
	8-28	0.06-0.2	0.11-0.17	6.1-7.8	Low	0.28	
	28-70	0.6-2.0	0.11-0.17	6.1-8.4	Low	0.28	

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/In	pH			
28----------	0-7	0.06-0.2	0.15-0.20	5.6-7.8	High----------	0.32	5
Kaufman	7-65	<0.06	0.15-0.18	5.6-7.8	Very high------	0.32	
29*:							
Kaufman---------	0-7	0.06-0.2	0.15-0.20	5.6-7.8	High----------	0.32	5
	7-65	<0.06	0.15-0.18	5.6-7.8	Very high------	0.32	
Gowker----------	0-30	0.6-2.0	0.12-0.20	5.6-6.5	Moderate-------	0.32	5
	30-44	0.06-0.2	0.12-0.20	5.6-7.3	Moderate-------	0.37	
	44-60	0.2-0.6	0.12-0.20	5.6-8.4	Moderate-------	0.37	
30----------	0-80	>20	0.02-0.05	4.5-6.0	Very low-------	0.15	5
Kershaw							
31*:							
Kitterll--------	0-6	0.6-2.0	0.11-0.17	5.1-6.5	Low----------	0.24	1
	6-8	---	---	---	----------	---	
Rock outcrop.							
32*---------	0-74	6.0-20	0.05-0.10	5.1-6.5	Very low-------	0.17	5
Landman	74-80	0.2-0.6	0.10-0.15	4.5-6.5	Low----------	0.24	
33----------	0-60	<0.06	0.12-0.18	6.1-8.4	High----------	0.32	4
Leson							
34----------	0-9	0.6-2.0	0.11-0.18	5.1-6.5	Low----------	0.43	5
Lufkin	9-55	<0.06	0.12-0.18	5.1-7.8	Very high------	0.32	
	55-75	<0.06	0.10-0.14	6.1-8.4	High----------	0.37	
35*:							
Lufkin----------	0-9	0.6-2.0	0.11-0.18	5.1-6.5	Low----------	0.43	5
	9-55	<0.06	0.12-0.18	5.1-7.8	Very high------	0.32	
	55-75	<0.06	0.10-0.14	6.1-8.4	High----------	0.37	
Annona----------	0-4	0.6-2.0	0.13-0.18	4.5-6.5	Low----------	0.43	5
	4-44	<0.06	0.12-0.18	4.5-6.0	High----------	0.32	
	44-80	<0.06	0.12-0.18	5.6-8.4	High----------	0.28	
36----------	0-21	0.6-2.0	0.11-0.15	4.5-6.0	Low----------	0.43	5
Moten	21-36	0.6-2.0	0.11-0.20	4.5-6.5	Low----------	0.43	
	36-46	0.2-0.6	0.13-0.20	6.1-7.8	Low----------	0.49	
	46-75	0.06-0.2	0.12-0.18	5.6-7.8	Moderate-------	0.49	
37*---------	0-10	6.0-20	0.05-0.10	4.5-6.5	Low----------	0.17	5
Nugent	10-75	2.0-6.0	0.05-0.10	4.5-6.5	Low----------	0.17	
38*.							
Pits							
39----------	0-7	<0.06	0.15-0.2	5.1-6.5	Very high------	0.32	5
Redco	7-40	<0.06	0.15-0.2	4.5-6.0	Very high------	0.32	
	40-72	<0.06	0.15-0.2	6.1-8.4	Very high------	0.32	
40*:							
Rosenwall-------	0-6	2.0-6.0	0.11-0.15	4.5-6.5	Low----------	0.43	2
	6-27	<0.06	0.12-0.18	4.5-6.0	High----------	0.32	
	27-30	---	---	---	----------	---	
Goreen----------	0-13	2.0-6.0	0.11-0.17	4.5-6.5	Low----------	0.43	3
	13-31	<0.06	0.14-0.18	4.0-5.5	High----------	0.32	
	31-40	---	---	---	----------	---	
41*---------	0-60	<0.06	0.15-0.20	7.4-8.4	Very high------	0.32	5
Trinity							
42----------	0-20	2.0-6.0	0.10-0.15	5.1-7.3	Low----------	0.20	5
Woden	20-80	2.0-6.0	0.10-0.15	5.1-6.5	Low----------	0.20	

See footnote at end of table.

18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
43----------	0-7	0.6-2.0	0.10-0.15	4.5-6.5	Low----------	0.43	4
Woodtell	7-32	<0.06	0.12-0.18	3.6-5.5	High----------	0.32	
	32-58	0.06-0.2	0.15-0.20	4.5-6.0	High----------	0.32	
	58-80	---	---	---	----------	---	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 19.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," "apparent," and "perched." The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
1*: Annona	D	None	---	---	2.0-4.0	Apparent	Oct-May	>60	---	High	Moderate.
Urban land.											
2*, 3*: Annona	D	None	---	---	2.0-4.0	Apparent	Oct-May	>60	---	High	Moderate.
4, 5: Arol	D	None	---	---	0-1.5	Perched	Oct-May	20-40	Rippable	High	Moderate.
6: Arriola	D	None	---	---	>6.0	---	---	20-40	Rippable	High	High.
7*: Conroe	B	None	---	---	2.0-3.5	Perched	Nov-May	>60	---	High	High.
8*: Depcor	B	None	---	---	2.0-3.5	Perched	Oct-May	>60	---	Moderate	Moderate.
Urban land.											
9*: Depcor	B	None	---	---	2.0-3.5	Perched	Oct-May	>60	---	Moderate	Moderate.
Huntsburg	D	None	---	---	0.5-2.0	Perched	Oct-May	>60	---	High	High.
10*: Depcor	B	None	---	---	2.0-3.5	Perched	Oct-May	>60	---	Moderate	Moderate.
Huntsburg	D	None	---	---	0.5-2.0	Perched	Oct-May	>60	---	High	High.
Gunter	B	None	---	---	3.5-5.0	Perched	Nov-May	>60	---	Moderate	High.
11*: Elmina	C	None	---	---	1.5-3.5	Perched	Oct-Jun	40-60	Rippable	High	High.
12, 13, 14*: Falba	D	None	---	---	0-1.5	Perched	Oct-May	20-40	Rippable	High	Moderate.
15*: Falba	D	None	---	---	0-1.5	Perched	Oct-May	20-40	Rippable	High	Moderate.
Arol	D	None	---	---	0-1.5	Perched	Oct-May	20-40	Rippable	High	Moderate.
16, 17*: Ferris	D	None	---	---	>6.0	---	---	>60	---	High	Low.
18*: Galilee	C	None	---	---	>6.0	---	---	20-40	Rippable	Moderate	High.
Gomery	B	None	---	---	3.0-4.5	Perched	Oct-Jun	40-60	Rippable	High	High.
19: Gladewater	D	Common	Brief to long.	Nov-May	0-3.5	Apparent	Nov-May	>60	---	High	Moderate.
20*: Gomery	B	None	---	---	3.0-4.5	Perched	Oct-Jun	40-60	Rippable	High	High.
21*: Gowker	C	Common	Brief	Oct-May	0.5-2.5	Perched	Oct-May	>60	---	High	Moderate.

See footnote at end of table.

TABLE 19.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
21*: Kanebreak	C	Common	Brief	Oct-May	0-1.5	Perched	Oct-May	>60	---	High	Moderate.
22* Gunter	B	None	---	---	3.5-5.0	Perched	Nov-May	>60	---	Moderate	High.
23 Houston Black	D	None	---	---	>6.0	---	---	>60	---	High	Low.
24*: Houston Black	D	None	---	---	>6.0	---	---	>60	---	High	Low.
Urban land.											
25 Kaman	D	Common	Long	Nov-Jun	0-2.5	Apparent	Sep-Jul	>60	---	High	Moderate.
26*: Kaman	D	Rare	Brief	Nov-Jun	0-2.5	Apparent	Sep-Jul	>60	---	High	Moderate.
Elysian variant	C	None	---	---	2.0-3.0	Perched	Nov-Apr	>60	---	High	Moderate.
27* Kanebreak	C	Common	Brief	Oct-May	0-1.5	Perched	Oct-May	>60	---	High	Moderate.
28 Kaufman	D	Common	Brief	Nov-May	0-3.5	Apparent	Nov-Apr	>60	---	High	Low.
29*: Kaufman	D	Common	Brief	Nov-May	0-3.5	Apparent	Nov-Apr	>60	---	High	Low.
Gowker	C	Common	Brief	Oct-May	0.5-2.5	Perched	Oct-May	>60	---	High	Moderate.
30 Kershaw	A	None	---	---	>6.0	---	---	>60	---	Low	High.
31*: Kitterll	D	None	---	---	>6.0	---	---	3-12	Rippable	Low	Moderate.
Rock outcrop.											
32* Landman	B	None	---	---	3.5-5.5	Perched	Oct-May	>60	---	Low	Moderate.
33 Leson	D	None	---	---	>6.0	---	---	36-80	Rippable	High	Low.
34 Lufkin	D	None	---	---	0-1.0	Perched	Oct-May	>60	---	High	Moderate.
35*: Lufkin	D	None	---	---	0-1.0	Perched	Oct-May	>60	---	High	Moderate.
Annona	D	None	---	---	2.0-4.0	Apparent	Oct-May	>60	---	High	Moderate.
36 Moten	C	None	---	---	2.0-4.0	Perched	Oct-May	>60	---	High	Moderate.
37* Nugent	A	Common	Brief to long.	Dec-Mar	>3.5	Apparent	Jan-Apr	>60	---	Low	Moderate.
38*. Pits											
39 Redco	D	None	---	---	0-2.0	Apparent	Oct-May	>60	---	High	Moderate.
40*: Rosenwall	D	None	---	---	>6.0	---	---	20-40	Rippable	High	High.

See footnote at end of table.

TABLE 19.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
40*: Goreen	D	None	---	---	0-2.0	Perched	Oct-May	20-40	Ripable	High	High.
41* Trinity	D	Frequent	Brief	Oct-May	0-3.0	Apparent	Oct-May	>60	---	High	Low.
42 Woden	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
43 Woodtell	D	None	---	---	1.5-4.0	Apparent	Oct-May	>60	---	High	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 20.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Annona	Fine, montmorillonitic, thermic Vertic Paleudalfs
Arol	Fine, montmorillonitic, thermic Typic Albaqualfs
Arriola	Fine, mixed, thermic Albaquultic Hapludalfs
Conroe	Clayey, kaolinitic, thermic Arenic Plinthic Paleudults
Depcor	Loamy, siliceous, thermic Arenic Paleudalfs
Elmina	Clayey, montmorillonitic, thermic Aquic Arenic Hapludalfs
Elysian variant	Coarse-loamy, siliceous, thermic Haplic Glossudalfs
Falba	Fine, montmorillonitic, thermic Typic Albaqualfs
Ferris	Fine, montmorillonitic, thermic Udorthentic Chromusterts
Galilee	Clayey, mixed, thermic Typic Hapludults
Gladewater	Fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts
Gomery	Loamy, siliceous, thermic Arenic Hapludults
Goreen	Clayey, mixed, thermic Typic Albaquults
Gowker	Fine-loamy, mixed, thermic Cumulic Hapludolls
Gunter	Loamy, siliceous, thermic Grossarenic Plinthic Paleudults
Houston Black	Fine, montmorillonitic, thermic Udic Pellusterts
Huntsburg	Fine, mixed, thermic Plinthaquic Paleudalfs
Kaman	Fine, montmorillonitic, thermic Vertic Haplaquolls
Kanebreak	Fine-loamy, mixed, thermic Cumulic Haplaquolls
Kaufman	Very-fine, montmorillonitic, thermic Typic Pelluderts
Kershaw	Thermic, uncoated Typic Quartzipsamments
Kitterll	Loamy, siliceous, nonacid, thermic, shallow Typic Udorthents
Landman	Loamy, siliceous, thermic Grossarenic Paleudalfs
Leson	Fine, montmorillonitic, thermic Udic Pellusterts
Lufkin	Fine, montmorillonitic, thermic Vertic Albaqualfs
Moten	Coarse-loamy, siliceous, thermic Aeric Ochraqualfs
Nugent	Sandy, siliceous, thermic Typic Udifluvents
Redco	Very-fine, montmorillonitic, thermic Aquentic Chromuderts
Rosenwall	Clayey, mixed, thermic Aquic Hapludults
Trinity	Very-fine, montmorillonitic, thermic Typic Pelluderts
Woden	Coarse-loamy, siliceous, thermic Typic Paleudalfs
Woodtell	Fine, montmorillonitic, thermic Vertic Hapludalfs

TABLE 21.--GEOLOGY OF WALKER COUNTY, BY MAP UNITS

Map unit	Position	Geologic unit	Age
Kaufman-Gowker	Bottom land	Holocene alluvium	Holocene.
All of Kaman-Landman-Elysian. Parts of the Gomery-Rosenwall-Moten (especially Moten).	Terrace	Deweyville formation, Beaumont formation.	Pleistocene.
Parts of the Depcor-Annona-Huntsburg. All of the Conroe.	Upland	Willis formation	Early pleistocene or late pliocene.
All of the Ferris-Annona-Houston Black. Parts of the Depcor-Annona-Huntsburg. Parts of the Falba-Elmina-Arriola.	Upland	Fleming formation	Miocene.
Parts of the Falba-Elmina-Arriola.	Upland	Catahoula formation	Miocene.
Parts of the Falba-Elmina-Arriola. Parts of the Woodtell-Falba. Parts of the Gomery-Rosenwall-Moten.	Upland	Jackson group, Whitsett formation*, Manning formation, Wellborn formation, Caddell formation.	Eocene.
Parts of the Woodtell-Falba. Parts of the Falba-Elmina-Arriola.	Upland	Yegua formation	Eocene.

*May be Oligocene in age. See Univ. Tex. Bur. Econ. Geology (1968) (12).

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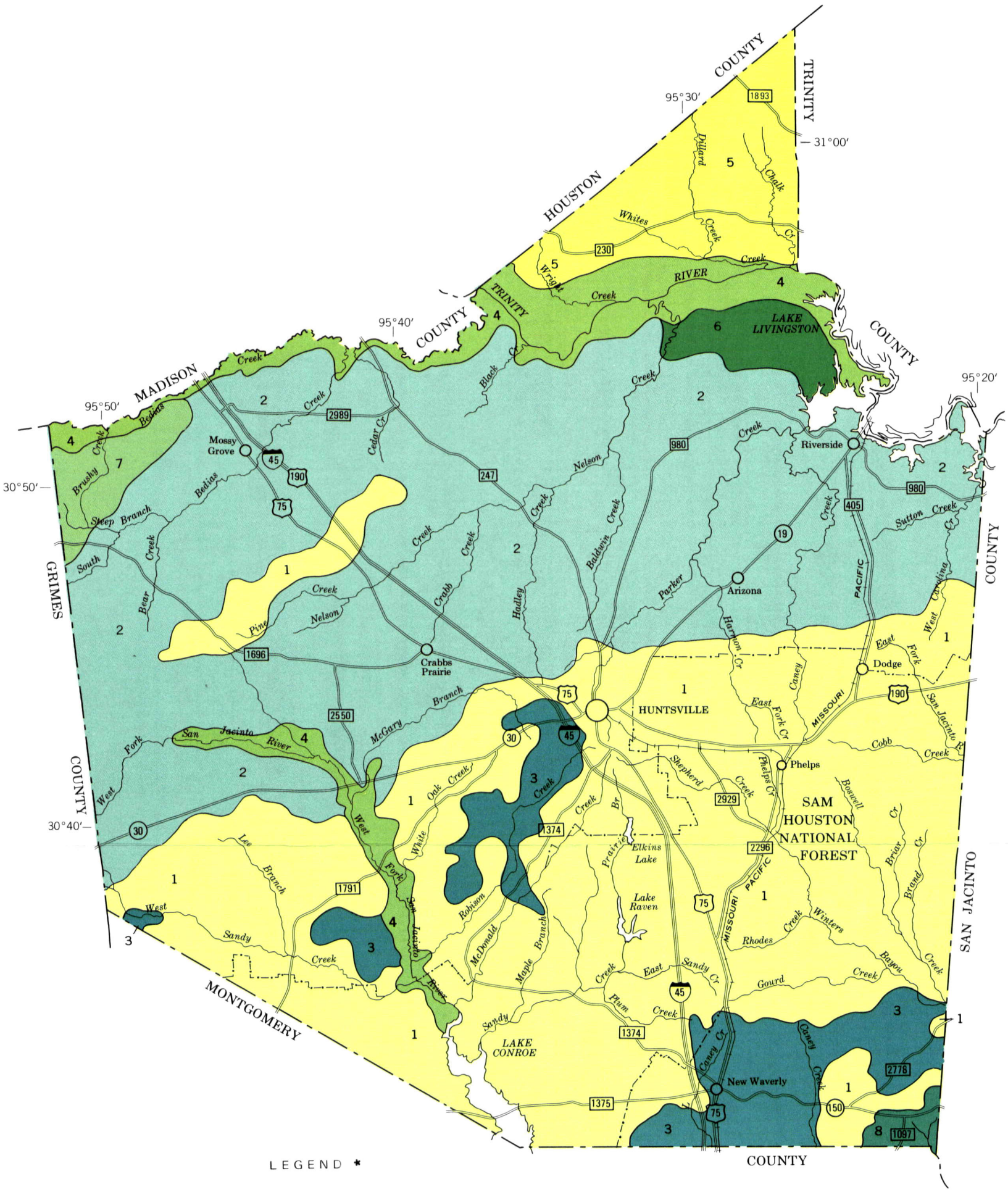


LEGEND *

1	DEPCOR–ANNONA–HUNTSBURG: Deep, sandy and loamy, gently undulating to gently rolling soils on uplands
2	FALBA–ELMINA–ARRIOLA: Moderately deep and deep, sandy and loamy, nearly level to sloping soils on uplands
3	FERRIS–ANNONA–HOUSTON BLACK: Deep, loamy and clayey, nearly level to sloping soils on uplands
4	KAUFMAN–GOWKER: Deep, loamy and clayey, nearly level soils on bottom lands
5	GOMERY–ROSENWALL–MOTEN: Moderately deep and deep, sandy and loamy, nearly level to rolling soils on uplands and terraces
6	KAMAN–LANDMAN–ELYSIAN VARIANT: Deep, sandy to clayey, nearly level and gently undulating soils on bottom lands and terraces
7	WOODTELL–FALBA: Moderately deep and deep, loamy, nearly level to sloping soils on uplands
8	CONROE: Deep, sandy, gently undulating soils on uplands

*Texture in the descriptive name refers to the surface layer of the major soils in each map unit.

Compiled 1978

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

N

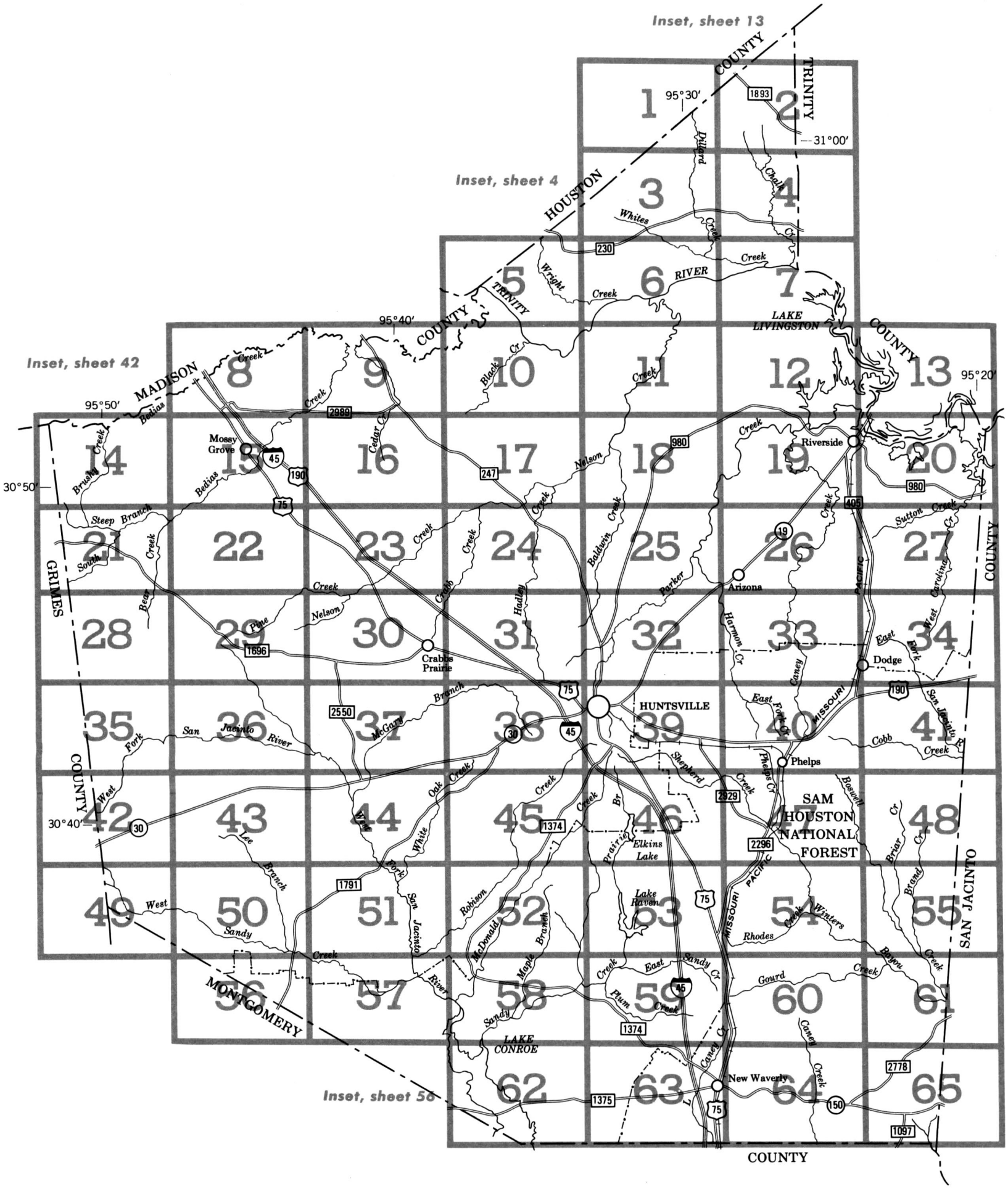
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
TEXAS AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

WALKER COUNTY, TEXAS

Scale 1:253,440

1 0 1 2 3 4 Miles



N

INDEX TO MAP SHEETS

WALKER COUNTY, TEXAS

Scale 1:253,440

1 0 1 2 3 4 Miles

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

SOIL LEGEND

Soil names followed by the superscript 1/ are broadly defined units. The composition of these units is more variable than that of others in the survey area but has been controlled well enough to be interpreted for the expected use of the soils.

SYMBOL	NAME
1	Annona-Urban land complex, 1 to 8 percent slopes
2	Annona association, gently undulating 1/
3	Annona association, gently rolling 1/
4	Arol fine sandy loam, 0 to 1 percent slopes
5	Arol fine sandy loam, 1 to 3 percent slopes
6	Arriola fine sandy loam, 1 to 5 percent slopes
7	Conroe association, gently undulating 1/
8	Depcor-Urban land complex, 1 to 8 percent slopes
9	Depcor-Huntsburg association, gently undulating 1/
10	Depcor-Huntsburg-Gunter association, gently rolling 1/
11	Elmina association, gently undulating 1/
12	Falba fine sandy loam, 0 to 1 percent slopes
13	Falba fine sandy loam, 1 to 5 percent slopes
14	Falba complex, 5 to 8 percent slopes
15	Falba and Arol Soils, 1 to 5 percent slopes, eroded 1/
16	Ferris clay, 1 to 5 percent slopes
17	Ferris clay, gullied
18	Galilee-Gomery association, rolling 1/
19	Gladewater clay, frequently flooded
20	Gomery association, undulating 1/
21	Gowker and Kanebreak soils, frequently flooded 1/
22	Gunter association, undulating 1/
23	Houston Black clay, 1 to 3 percent slopes
24	Houston Black-Urban land complex, 1 to 3 percent slopes
25	Kaman clay, occasionally flooded
26	Kaman-Elysian Variant complex, 0 to 2 percent slopes
27	Kanebreak soils, frequently flooded 1/
28	Kaufman clay, occasionally flooded
29	Kaufman-Gowker complex, frequently flooded
30	Kershaw sand, 0 to 5 percent slopes
31	Kitterll-Rock outcrop complex, 1 to 10 percent slopes
32	Landman association, gently undulating 1/
33	Leson clay, 0 to 3 percent slopes
34	Lufkin fine sandy loam, 0 to 1 percent slopes
35	Lufkin-Annona association, nearly level 1/
36	Moten fine sandy loam, 0 to 2 percent slopes
37	Nugent soils, frequently flooded 1/
38	Pits
39	Redco clay, 0 to 2 percent slopes
40	Rosenwall-Goreen association gently undulating 1/
41	Trinity soils, frequently flooded 1/
42	Woden fine sandy loam, 0 to 3 percent slopes
43	Woodtell fine sandy loam, 1 to 3 percent slopes

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool (Davis Airstrip; FLOOD POOL LINE)

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate (79)
- Federal (410)
- State (52)
- County, farm or ranch (378)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small (water; w)

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) (Indian Mound)
- Located object (label) (Tower)
- Tank (label) (GAS)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) (CANAL)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial (water; w)
- Intermittent (int; i)

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS (CeA; FoB2)

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

WALKER COUNTY, TEXAS — SHEET NUMBER 1

WALKER COUNTY, TEXAS NO. 1

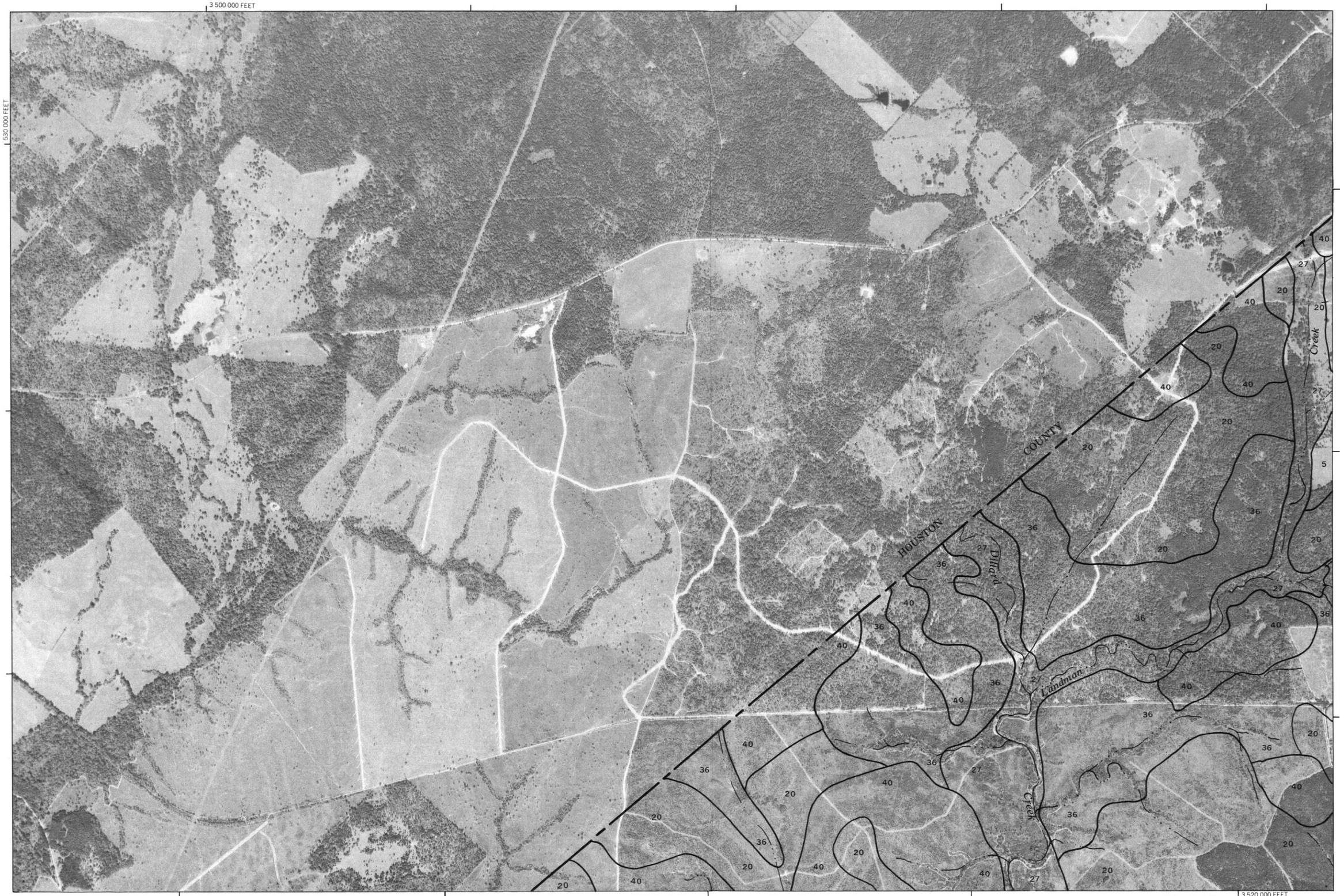
This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

3 500 000 FEET

530 000 FEET

520 000 FEET

3 520 000 FEET



(Joins sheet 2)

(Joins sheet 3)

1

N

1 Mile
5000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS — SHEET NUMBER 2

(2)

N

(Joins inset,13)

3 545 000 FEET

530 000 FEET

520 000 FEET

3 525 000 FEET

(Joins sheet 1)

(Joins sheet 4)

1 Mile

5000 Feet

Scale 1:20000

0 0 1000 2000 3000 4000 5000

¼ ½ ¾ 1

COUNTY

HOUSTON

TRINITY

CLAPP CEMETERY

Cibolk Creek

Turkey Creek

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 2

WALKER COUNTY, TEXAS — SHEET NUMBER 3

WALKER COUNTY, TEXAS NO. 3

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

3 500 000 FEET

515 000 FEET

(Joins sheet 1)

HOUSTON COUNTY

Thompson Branch

Pecan Bayou

Jenkins Branch

Dillard Creek

Dillard Creek

Eve Branch

Branch

WHITES CREEK

Branch

CHALK CEMETERY

New Hope Church

DUNLAP CEMETERY

SPIVEY CEMETERY

230

505 000 FEET

(Joins sheet 4)

(Joins sheet 6)

3 520 000 FEET

3

N

1 Mile

5000 Feet

Scale · 1:20000

WALKER COUNTY, TEXAS — SHEET NUMBER 4

4

N

1 Mile 0 5000 Feet 0

Scale 1:20000 (Joins sheet 3)

¼ 1000 ½ 2000 ¾ 4000 1 5000

(Joins sheet 2)

3 535 000 FEET

515 000 FEET

505 000 FEET

3 525 000 FEET

(Joins sheet 7)

CHALK CEMETERY

CHALK CREEK

Turkey Creek

TRINITY COUNTY

CHALK CREEK

230

3 495 000 FEET

515 000 FEET

500 000 FEET

3 490 000 FEET

(Joins sheet 5)

HOUSTON COUNTY

EASTHAM STATE PRISON FARM

230

(Joins sheet 3)

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 4

WALKER COUNTY, TEXAS — SHEET NUMBER 5

WALKER COUNTY, TEXAS NO. 5

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

3 475 000 FEET

495 000 FEET

(Joins inset, 4)

EASTHAM STATE PRISON FARM

230

COUNTY

HOUSTON COUNTY

TRINITY

RIVER

MADISON

BEDIAS

CREEK

Mason Slough

Mellon Branch

Harpe Branch

Wright Creek

TRINITY RIVER

water

(Joins sheet 6)

485 000 FEET

3 495 000 FEET

(Joins sheet 10)

N

1 Mile

5000 Feet

Scale 1:20000

5

WALKER COUNTY, TEXAS — SHEET NUMBER 6

6

N

(Joins sheet 3)

3 520 000 FEET

500 000 FEET

Waller Lake

Dillard Creek

CREEK

Bear Creek

WHITES

RIVER

TRINITY

ELLIS

STATE

PRISON

FARM

Wright Creek

Big Tucker Lake

NELSON CREEK

Cincinnati Bluff

485 000 FEET

3 500 000 FEET

(Joins sheet 11)

(Joins sheet 5)

(Joins sheet 7)

1 Mile

5000 Feet

0

Scale 1:20000

1/4 1000

1/2 2000

3/4 3000

1 4000

5000

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 6

WALKER COUNTY, TEXAS — SHEET NUMBER 7

WALKER COUNTY, TEXAS NO. 7

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

3 525 000 FEET

500 000 FEET

(Joins sheet 4)

(Joins sheet 6)

(Joins sheet 11)

3 545 000 FEET

485 000 FEET

Whites Creek

LAKE LIVINGSTON

TRINITY RIVER

TRINITY RIVER

TRINITY COUNTY

ELLIS PRISON FARM

STATE

7

N

1 Mile

5000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS — SHEET NUMBER 8

8

N

1 Mile

5000 Feet

Scale 1:20000

(Joins inset, sheet 42)

3 445 000 FEET

480 000 FEET

470 000 FEET

3 425 000 FEET

(Joins sheet 15)

(Joins sheet 9)

MADISON COUNTY

BEDIAS CREEK

HARMONY CEMETERY

Mill Branch

South Bedias Creek

Marling Branch

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 8

WALKER COUNTY, TEXAS NO. 9

- This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

3 450 000 FEET

480 000 FEET

470 000 FEET

3 470 000 FEET

(Joins sheet 8)

(Joins sheet 10)

(Joins sheet 16)

9

N

1 Mile

5 000 Feet

Scale 1:20000

Madison County Creek

Bedias Creek

Cedar Creek

South Bedias Creek

Bedias Creek Branch

Kaiser Branch

FALBA CEMETERY

water

WALKER COUNTY, TEXAS — SHEET NUMBER 10

10

N

Scale 1:20000

1 Mile 5000 Feet

0 ¼ ½ ¾ 1

3 495 000 FEET

480 000 FEET

470 000 FEET

3 475 000 FEET

(Joins sheet 9)

(Joins sheet 11)

(Joins sheet 17)

MADISON COUNTY

Beatas Creek

Moten Lake

CALHOUN CEMETERY

Graveyard Creek

Black Creek

Oak Creek

TRINITY RIVER

Horshoe Lake

Wyser Bluff

Lost Indian Lake

Indian Hill Lake

water

White Oak Branch

West Sulphur Branch

East Sulphur Branch

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 10

(Joins sheet 6)

3 500 000 FEET

480 000 FEET

Ft. CINCINNATI CEMETERY

C R E E K

MT OLIVE CEMETERY

Mt Olive Church

ELLIS

Creek

Turkey

Creek

STATE

PRISON

FARM

West

Little Tucker Lake

NELSON

Flag Point Lake

water

Turkey

980

470 000 FEET

3 520 000 FEET

(Joins sheet 10)

(Joins sheet 18)

(Joins sheet 12)

11

N

1 Mile

5 000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS NO. 11

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS — SHEET NUMBER 12

(12)

N

1 Mile

5000 Feet

0 0

Scale 1:20000

(Joins sheet 11)

(Joins sheet 7)

3 545 000 FEET

485 000 FEET

470 000 FEET

3 525 000 FEET

(Joins sheet 19)

(Joins sheet 13)

TRINITY

TRINITY COUNTY

RIVER

ELLIS

STATE

PRISON

FARM

Turkey Creek

water

LAKE LIVINGSTON

980

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 12

WALKER COUNTY, TEXAS NO. 13

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

3 550 000 FEET

485 000 FEET

3 525 000 FEET

540 000 FEET

535 000 FEET

3 530 000 FEET

(Joins sheet 2)

(Joins sheet 12)

TRINITY COUNTY

HOUSTON COUNTY

TRINITY RIVER

LAKE LIVINGSTON

LIVINGSTON Reservoir

TRINITY RIVER

TRINITY COUNTY

(Joins sheet 20)

3 570 000 FEET

470 000 FEET

13

N

1 Mile

5 000 Feet

Scale · 1:20000

WALKER COUNTY, TEXAS — SHEET NUMBER 14

(Joins inset,42)

3 420 000 FEET

465 000 FEET

(14)

N

1 Mile

5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

Scale·1:20000

MADISON COUNTY

GRIMES COUNTY

Bedias Creek

Boney Branch

Creek

water

Bushy Branch

Cane Branch

450 000 FEET

3 405 000 FEET

(Joins sheet 21)

(Joins sheet 15)

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 14

WALKER COUNTY, TEXAS — SHEET NUMBER 15

(Joins sheet 8)

15

N

3 425 000 FEET

465 000 FEET

(Joins sheet 14)

(Joins sheet 16)

3 445 000 FEET

(Joins sheet 22)

450 000 FEET

1 Mile

5 000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS NO. 15

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

16

WALKER COUNTY, TEXAS — SHEET NUMBER 16

(Joins sheet 9)

N

3 470 000 FEET

465 000 FEET

1 Mile

5000 Feet

Scale 1:20000

(Joins sheet 15)

Cedar Creek

Manning Branch

Cedar Creek

Kay Branch

Gum Branch

MANNING CEMETERY

247

45

450 000 FEET

3 450 000 FEET

(Joins sheet 23)

(Joins sheet 17)

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 16

WALKER COUNTY, TEXAS — SHEET NUMBER 17

(Joins sheet 10)

3 475 000 FEET

465 000 FEET

Easam Mill Seat Lake

water

water

Big Wolf Sulphur Branch

Post Oak Branch

Possum Branch

Gum Branch

Nelson Creek

Hadley Creek

Sudan Lake

247

(Joins sheet 16)

(Joins sheet 18)

(Joins sheet 24)

3 495 000 FEET

455 000 FEET

17

N

1 Mile

5000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS NO. 17

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS — SHEET NUMBER 18

18

N

(Joins sheet 11)

3 520 000 FEET

465 000 FEET

445 000 FEET

3 500 000 FEET

(Joins sheet 25)

(Joins sheet 17)

(Joins sheet 19)

Scale 1:20000

1 Mile 0 5000 Feet

0 1000 2000 3000 4000 5000

¼ ½ ¾ 1

ELLIS STATE PRISON FARM

CLINE PRAIRIE CEMETERY

Creek

Nelson

Little

Bardwell

School

Branch

Turkey

Cedar

Harmon

water

980

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 18

WALKER COUNTY, TEXAS — SHEET NUMBER 19

WALKER COUNTY, TEXAS NO. 19

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

3 525 000 FEET

1465 000 FEET

(Joins sheet 12)

(Joins sheet 18)

(Joins sheet 20)

(Joins sheet 26)

3 545 000 FEET

1455 000 FEET

19

N

1 Mile

5000 Feet

Scale 1:20000

ELLIS PRISON FARM

STATE PRISON FARM

HARMON

LAKE LIVINGSTON

TRINITY RIVER

Mud Lake

Campus Lake

Creek

Rocky Creek

Bethy Creek

MISSOURI PACIFIC

water

980

860

405

WALKER COUNTY, TEXAS — SHEET NUMBER 20

(20)

N

(Joins sheet 13)

3 570 000 FEET

465 000 FEET

455 000 FEET

3 550 000 FEET

(Joins sheet 27)

(Joins sheet 19)

1 Mile

5000 Feet

Scale 1:20000

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

TRINITY COUNTY

TRINITY RIVER

LAKE LIVINGSTON

LAKE LIVINGSTON

SAN JACINTO COUNTY

Riverside

MISSOURI PACIFIC

980

Bethu Creek

Caroling Creek

Sulton Creek

West

GOSPEL HILL CEMETERY

water

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 20

WALKER COUNTY, TEXAS — SHEET NUMBER 21

(Joins sheet 14)

3 405 000 FEET

445 000 FEET

435 000 FEET

3 425 000 FEET

(Joins sheet 28)

(Joins sheet 22)

21

N

1 Mile

5000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS NO. 21

This map is compiled on 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS — SHEET NUMBER 22

22

N

(Joins sheet 15)

3 445 000 FEET

450 000 FEET

(Joins sheet 21)

Scale 1:20000

1 Mile 5000 Feet

0 1000 2000 3000 4000 5000

¼ ½ ¾ 1

South Bedias Creek

Schoolhouse Branch

Paul Chapel

Fork

White Oak Branch

Swamp

water

1696

435 000 FEET

3 430 000 FEET

(Joins sheet 29)

(Joins sheet 23)

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 22

WALKER COUNTY, TEXAS — SHEET NUMBER 23

(Joins sheet 16)

23

N

3 450 000 FEET

450 000 FEET

(Joins sheet 22)

(Joins sheet 24)

3 470 000 FEET

435 000 FEET

(Joins sheet 30)

Nelson Creek

Rocky Nelson Branch

Pine Creek

Crabb Creek

water

1 Mile

5000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS NO. 23

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(Joins sheet 17)

(24)

N

1 Mile
5000 Feet
0
0
Scale 1:20000
(Joins sheet 23)

1/4
1000
1/2
2000
3/4
3000
4000
1
5000

3 495 000 FEET

450 000 FEET

435 000 FEET

3 475 000 FEET

(Joins sheet 31)

(Joins sheet 25)

Nelson Creek
Crabb Creek
Hadley Creek
Thompson Branch
Little Creek
Pine Prairie Church
Harmony Grove Church
water
247

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 24

WALKER COUNTY, TEXAS — SHEET NUMBER 25

(Joins sheet 18)

25

N

3 500 000 FEET

450 000 FEET

(Joins sheet 24)

(Joins sheet 26)

440 000 FEET

3 520 000 FEET

(Joins sheet 32)

1 Mile

5000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS NO. 25

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS — SHEET NUMBER 26

(26)

N

(Joins sheet 19)

3 545 000 FEET

450 000 FEET

440 000 FEET

3 525 000 FEET

(Joins sheet 33)

(Joins sheet 25)

(Joins sheet 27)

Scale 1:20000

1 Mile 0

5000 Feet 0

1/4 1000

1/2 2000

3/4 3000

1 4000

5000

water

Horshoe Lake

MC KASKLE CEMETERY

PAT HENRY CEMETERY

Rocky Creek

Caney Creek

Oak Creek

Hannon Creek

MISSOURI PACIFIC

405

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 26

WALKER COUNTY, TEXAS — SHEET NUMBER 27

WALKER COUNTY, TEXAS NO. 27

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(Joins sheet 26)

3 550 000 FEET

455 000 FEET

(Joins sheet 20)

27

N

1 Mile

5000 Feet

Scale 1:20000

440 000 FEET

(Joins sheet 34)

3 570 000 FEET

Creek

Sutton

Creek

Carolina

West

water

Red Oak Creek

MISSOURI PACIFIC

SAN JACINTO COUNTY

WALKER COUNTY, TEXAS — SHEET NUMBER 28

28

N

(Joins sheet 21)

3 425 000 FEET

430 000 FEET

420 000 FEET

3 405 000 FEET

(Joins sheet 35)

(Joins sheet 29)

1 Mile

5000 Feet

Scale 1:20000

1 0 0 ¼ ½ ¾ 1

5000 4000 3000 2000 1000 0

COUNTY

GRIMES

Sulphur Creek

Bear Creek

Sulphur Creek

water

McCOWAN CEMETERY

Hopewell Church

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 28

WALKER COUNTY, TEXAS — SHEET NUMBER 29

(Joins sheet 22)

29

N

3 430 000 FEET

430 000 FEET

MC ADAMS CEMETERY

Pine Creek

Mill Branch

Rocky Creek

1696

(Joins sheet 28)

(Joins sheet 30)

(Joins sheet 36)

3 450 000 FEET

420 000 FEET

1 Mile 5000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS NO. 29

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS — SHEET NUMBER 30

(30)

N

1 Mile

5000 Feet

0

Scale 1:20000

1000 2000 3000 4000 5000

¼ ½ ¾ 1

(Joins sheet 23)

(Joins sheet 29)

(Joins sheet 37)

(Joins sheet 31)

3 470 000 FEET

3 455 000 FEET

420 000 FEET

430 000 FEET

PETREE CEMETERY

Cook Spring Church

Crabbs Prairie

Creek

Rocky Branch

Crabb Creek

Nelson Branch

Robinson

water

75 190

1696

2560

45

WALKER COUNTY, TEXAS NO. 30

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS — SHEET NUMBER 31

WALKER COUNTY, TEXAS NO. 31

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

3 475 000 FEET

430 000 FEET

(Joins sheet 30)

(Joins sheet 24)

31

N

1 Mile

5000 Feet

Scale 1:20000

(Joins sheet 32)

420 000 FEET

3 495 000 FEET

(Joins sheet 38)

St Paul Church

HARPER CEMETERY

WYNNE

PRISON FARM

STATE

HUNTSVILLE
(county seat)

Thompson Branch

Sixmile Branch

Hadley Creek

Huntsville Airport

Parker Creek

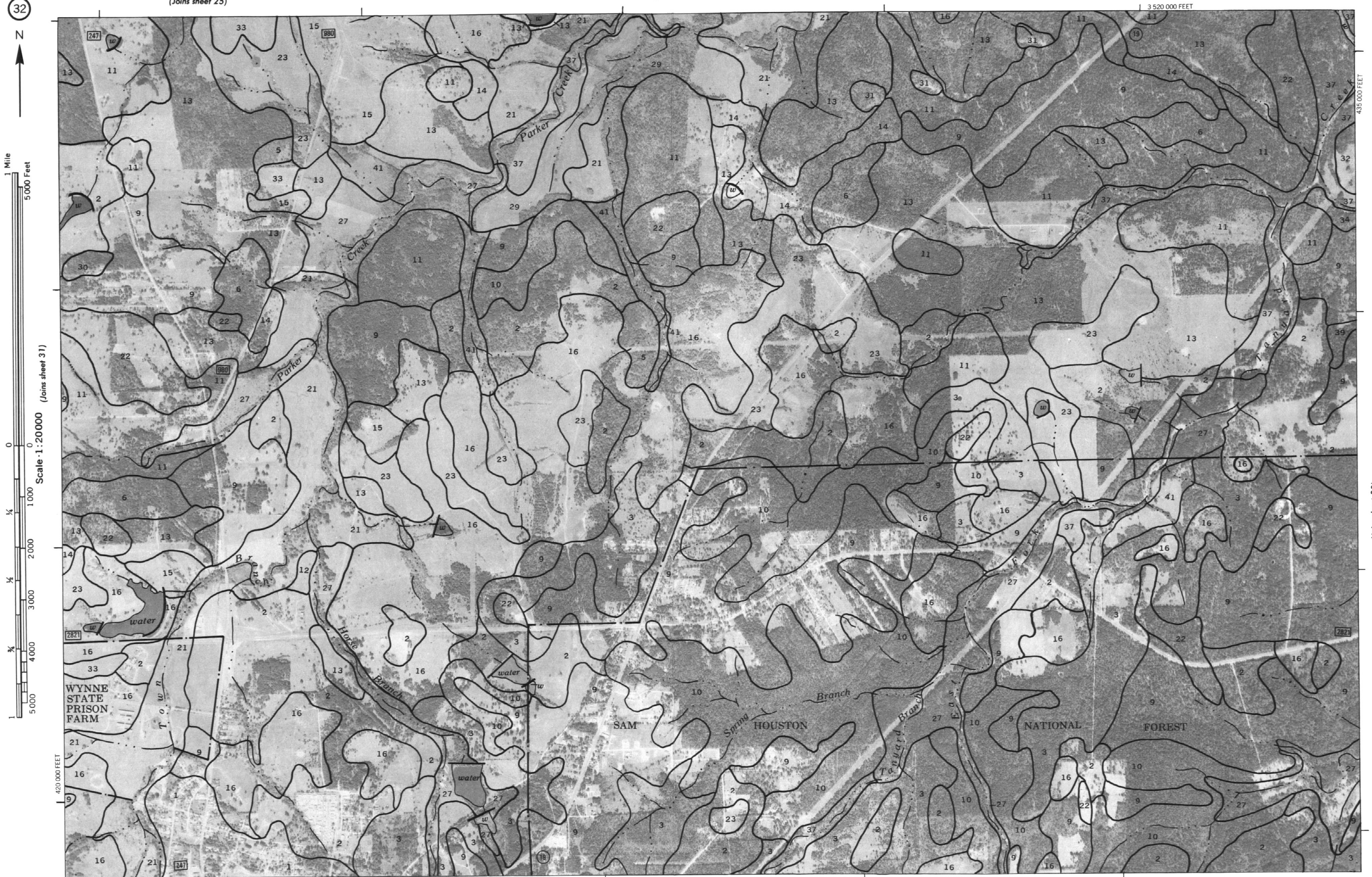
McGary Creek

water

(32)

WALKER COUNTY, TEXAS — SHEET NUMBER 32

(Joins sheet 25)



(Joins sheet 31)

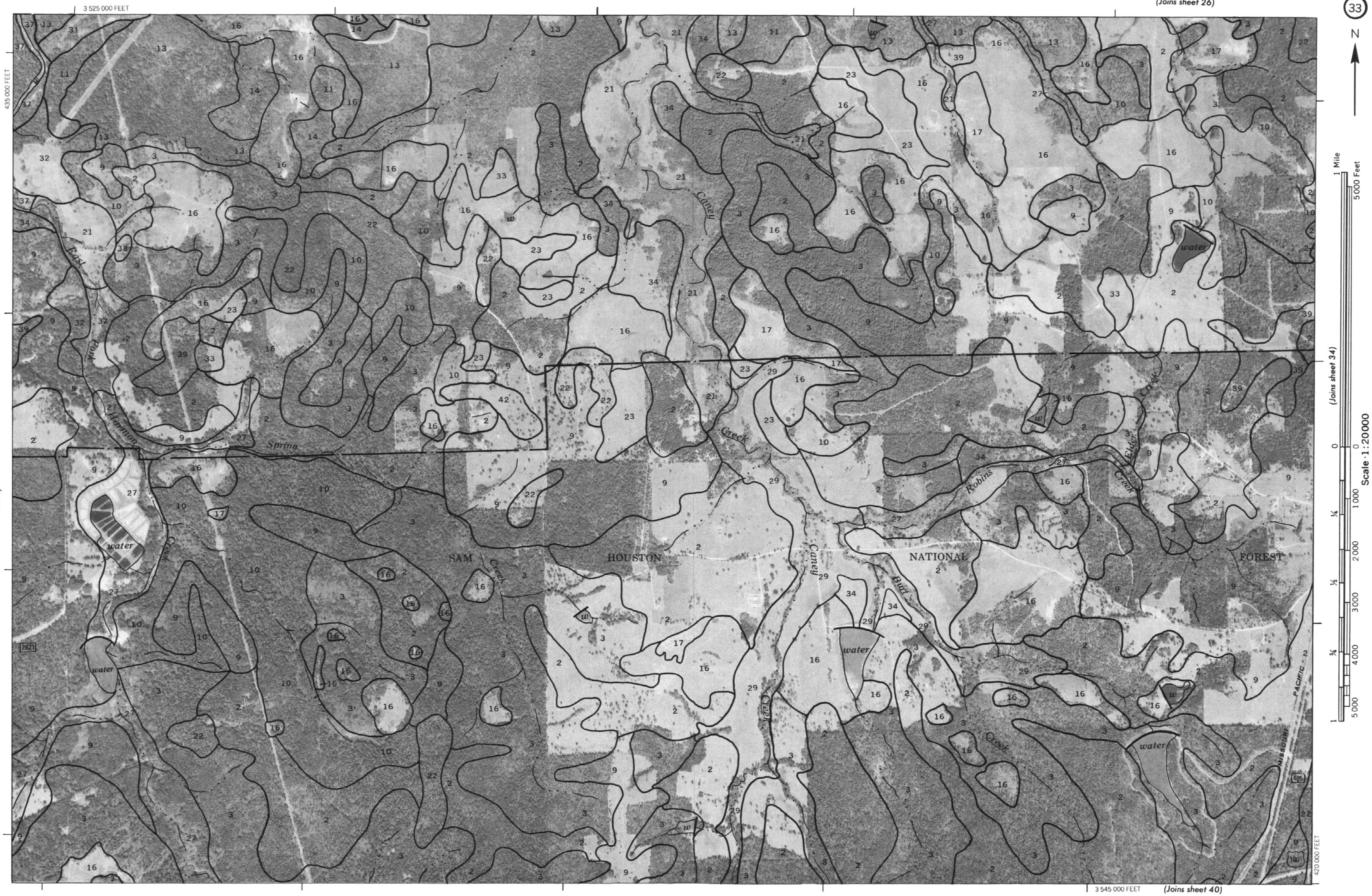
(Joins sheet 33)

(Joins sheet 39)

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 32

WALKER COUNTY, TEXAS — SHEET NUMBER 33



WALKER COUNTY, TEXAS NO. 33

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

34

N

(Joins sheet 27)

3 570 000 FEET

435 000 FEET

1 Mile

5000 Feet

0

0

Scale 1:20000

(Joins sheet 33)

¼

1000

½

2000

¾

3000

1

4000

5000

water

PACIFIC

MISSOURI

DODGE CEMETERY

East Fork

West Carolina Creek

CHAPEL CEMETERY

East Carolina Creek

COUNTY

Dodge

SAM HOUSTON NATIONAL FOREST

JACINTO

SAN JACINTO River

420 000 FEET

3 550 000 FEET

(Joins sheet 41)

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 34

WALKER COUNTY, TEXAS — SHEET NUMBER 35

(Joins sheet 28)

3 405 000 FEET

415 000 FEET

Pilgrim Rest Church

Hopewell Church

COUNTY

GRIMES

MUSTANG CEMETERY

Neely

Spring

Jacinto

San

Creek

River

Branch

Fork

West

Rocky

(Joins sheet 42)

3 425 000 FEET

35

N

1 Mile

5000 Feet

Scale 1:20000

405 000 FEET

(Joins sheet 36)

WALKER COUNTY, TEXAS NO. 35

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS — SHEET NUMBER 36

(36)

N

(Joins sheet 29)

3 450 000 FEET

415 000 FEET

405 000 FEET

(Joins sheet 35)

(Joins sheet 37)

(Joins sheet 43)

3 430 000 FEET

1 Mile

5000 Feet

Scale 1:20000

0 0

¼ 1000

½ 2000

¾ 3000

1 4000

1 5000

Rocky Creek

West Fork San Jacinto River

Branch

Era Creek

San Jacinto River

Morgan Lake

water

Sand Branch

Cedar Creek

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 36

WALKER COUNTY, TEXAS — SHEET NUMBER 37

(Joins sheet 30)

37

N

3 455 000 FEET

415 000 FEET

(Joins sheet 36)

(Joins sheet 38)

405 000 FEET

(Joins sheet 44)

3 475 000 FEET

Robinson Creek

Rocky Creek West Fork

San Jacinto River

McGary Creek

Scott Branch

water

Mt Zion Church

EBENEZER CEMETERY

1 Mile

5000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS NO. 37

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS — SHEET NUMBER 38

38

N

(Joins sheet 31)

3 500 000 FEET

415 000 FEET

405 000 FEET

3 480 000 FEET

(Joins sheet 37)

(Joins sheet 39)

(Joins sheet 45)

Scale 1:20000

1 Mile 5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

McGary Creek

WYNNE STATE PRISON FARM

HUNTSVILLE (county seat)

Hills Chapel

Central Church

water

Creek

Robinson Creek

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 38

WALKER COUNTY, TEXAS — SHEET NUMBER 39

(Joins sheet 32)

39

N

3 500 000 FEET

415 000 FEET

405 000 FEET

3 525 000 FEET

(Joins sheet 38)

(Joins sheet 40)

(Joins sheet 46)

WALKER COUNTY, TEXAS NO. 39

This map is compiled on 1975 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 Mile
5000 Feet
Scale 1:20000
1000 0 1000 2000 3000 4000 5000

HUNTSVILLE
(county seat)

SAM HOUSTON STATE TEACHERS COLLEGE

OAK WOOD CEMETERY

Wesley Memorial Church

Sam Houston High School

PRISON CEMETERY

St Galilee Church

SOUTH SIDE CEMETERY

SAM HOUSTON NATIONAL FOREST

Good Hope Church

Calvary Church

GRANT COLONY CEMETERY

Mallery Lake

water

Shepherd Creek

McDonald Creek

Tanyard Creek

Fork Tanyard Creek

East Fork

Ford Branch

WALKER COUNTY, TEXAS — SHEET NUMBER 40

40

N

(Joins sheet 33)

3 545 000 FEET

420 000 FEET

1 Mile

5000 Feet

0 0

Scale 1:20000

(Joins sheet 39)

405 000 FEET

3 525 000 FEET

(Joins sheet 47)

(Joins sheet 41)

SAM HOUSTON NATIONAL FOREST

East Fork Harmon Creek

Carter Creek

Cobb Creek

Creek

Bwr

Truevine Church

Tillie Lake

Phelps

Shepherd Creek

Phelps Creek

Boswell Creek

PACIFIC

MISSOURI

water

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 40

WALKER COUNTY, TEXAS — SHEET NUMBER 41

(Joins sheet 34)

41

N

3 550 000 FEET

420 000 FEET

SAM HOUSTON NATIONAL FOREST

SAN JACINTO COUNTY

East Fork San Jacinto River

Cobb Creek

Jacinto Creek

Rock Creek

CLEVELAND CEMETERY

1 Mile

5000 Feet

Scale 1:20000

(Joins sheet 40)

(Joins sheet 48)

405 000 FEET

3 570 000 FEET

WALKER COUNTY, TEXAS NO. 41

This map is compiled on 1975 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS — SHEET NUMBER 42

(42)

N

1 Mile

5000 Feet

Scale 1:20000

0 0 ¼ ½ ¾ 1 1000 2000 3000 4000 5000

(Joins sheet 35)

3 425 000 FEET

400 000 FEET

Loma

West Fork Sam Jacinto River

Cedar Creek

Rocky Branch

Clear Branch

Dennis Branch

water

GRIMES COUNTY

(30)

(Joins sheet 43)

(Joins sheet 49)

3 415 000 FEET

385 000 FEET

3 420 000 FEET

470 000 FEET

MADISON COUNTY

Bedias Creek

Big Creek

Mill

(Joins sheet 8)

466 000 FEET

3 415 000 FEET

(Joins sheet 14)

4000 AND 5000-FOOT GRID TICKS

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 42

WALKER COUNTY, TEXAS — SHEET NUMBER 43

(Joins sheet 36)

3 430 000 FEET

400 000 FEET

Wesley Grove

Paces Chapel

Sweet Home Church

FOSTER CEMETERY

FOSTER CEMETERY

ROSS CEMETERY

BRUSHY CEMETERY

Cedar Creek

Sand Branch

Gum Branch

Lee Branch

Welch Branch

Casidy Branch

water

3179

(Joins sheet 42)

(Joins sheet 44)

(Joins sheet 50)

385 000 FEET

3 450 000 FEET

43

N

1 Mile

5000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS NO. 43

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS — SHEET NUMBER 44

(44)

N

(Joins sheet 37)

3 475 000 FEET

400 000 FEET

(Joins sheet 43)

(Joins sheet 45)

385 000 FEET

3 455 000 FEET

(Joins sheet 51)

1 Mile
5000 Feet

0
0

Scale 1:20000

¼ 1000
½ 2000
¾ 4000
1 5000

Gum Branch
West Fork
McGary Creek
Pain Branch
Oak Creek
White Oak Creek
Sun Jacinto Creek
Pain Branch
Welch Branch
Cassidy Branch
River Branch
White Oak Creek
water
1791

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 44

(Joins sheet 38)

45

N

3 480 000 FEET

400 000 FEET

Creek

Pine Hill Church

Robinson

Creek

SAM Club Lake

Branch

Robinson

Creek

Sunset Lake

HOUSTON NATIONAL FOREST

MARTHA CHAPEL CEMETERY

Pleasant Grove Church

McDonald

HIGHTOWER CEMETERY

(Joins sheet 44)

(Joins sheet 46)

(Joins sheet 52)

390 000 FEET

3 500 000 FEET

1 Mile

5 000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS NO. 45

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS — SHEET NUMBER 46

(46)

N

(Joins sheet 39)

3 525 000 FEET

400 000 FEET

(Joins sheet 45)

Scale 1:20000

1 Mile 5000 Feet

0 0

¼ 1000

½ 2000

¾ 4000

1 5000

390 000 FEET

3 505 000 FEET

(Joins sheet 53)

(Joins sheet 47)

Baldwin Lake

McDonald Creek

water

GOREE

STATE

PRISON

FARM

Mays

Elkia Lake Church

Elkins Lake

Shepherd Creek

Creek

SAM

HOUSTON

Branch

Alligator

Prairie

NATIONAL

FOREST

water

Chinquapin

Creek

Big

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 46

(47)

WALKER COUNTY, TEXAS NO. 47

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS — SHEET NUMBER 48

(48)

N

(Joins sheet 41)

3 570 000 FEET

400 000 FEET

Roark Creek

Creek

Boswell Creek

Briar Creek

Brandy Creek

SAM HOUSTON NATIONAL FOREST

SAN JACINTO COUNTY

1 Mile
5000 Feet

0 0
¼ 1000
½ 2000
¾ 4000
1 5000

Scale 1:20000

(Joins sheet 47)

390 000 FEET

3 550 000 FEET

(Joins sheet 55)

This map is compiled on 1975 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 48

(Joins sheet 42)

3 405 000 FEET

380 000 FEET

370 000 FEET

3 425 000 FEET

GRIMES COUNTY

MONTGOMERY COUNTY

West Rocky Branch

Dennis Branch

Sandy Creek

(Joins sheet 50)

49

N

1 Mile

5000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS NO. 49

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS — SHEET NUMBER 50

(50)

N

1 Mile

5000 Feet

0 0

Scale 1:20000

(Joins sheet 49)

(Joins sheet 43)

3 450 000 FEET

380 000 FEET

370 000 FEET

3 430 000 FEET

(Joins sheet 56)

(Joins sheet 51)

Clear Branch

Gum Branch

West Sandy Creek

Sandy Branch

Lee Branch

Sandy Creek

MONTGOMERY COUNTY

SAM HOUSTON NATIONAL FOREST

San Jacinto

LEE CEMETERY

Farris Chapel

3179

1791

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 50

WALKER COUNTY, TEXAS — SHEET NUMBER 51

(Joins sheet 44)

51

N

3 455 000 FEET

380 000 FEET

Goshen

Little Zion Church

Mt Prairie Church

Cassidy Branch

Welch Branch

West Fork San Jacinto River

Robinson Creek

West Sandy Creek

SAM HOUSTON NATIONAL FOREST

1791

(Joins sheet 50)

(Joins sheet 52)

(Joins sheet 57)

3 475 000 FEET

370 000 FEET

1 Mile

5000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS NO. 51

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

52

N

(Joins sheet 45)

3 500 000 FEET

385 000 FEET

Black Creek

Pleasant Grove Church

1374

Creek

BOUNDARY

Branch

Robinson

McDonald

FOREST

HOLLOWAY CEMETERY

SAM HOUSTON

NATIONAL FOREST

Persimmon Lake

Robinson Creek

Creek

Persimmon

Union Hill Church

UNION HILL CEMETERY

McDonald

NATIONAL FOREST

Maple Branch

1314

370 000 FEET

3 480 000 FEET

(Joins sheet 58)

(Joins sheet 51)

(Joins sheet 53)

1 Mile

5000 Feet

0 0

Scale 1:20000

¼ 1000

½ 2000

¾ 4000

1 5000

This map is compiled on 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 52

WALKER COUNTY, TEXAS — SHEET NUMBER 53

53

N

(Joins sheet 46)

3 505 000 FEET

385 000 FEET

(Joins sheet 52)

(Joins sheet 54)

(Joins sheet 59)

3 525 000 FEET

375 000 FEET

HUNTSVILLE STATE PARK

SAM HOUSTON NATIONAL FOREST

LAKE RAVEN

Prairie Branch

Chinquapin Creek

Big Creek

Little Creek

Prairie Branch

MISSOURI PACIFIC

1 Mile

5000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS NO. 53

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

54

WALKER COUNTY, TEXAS — SHEET NUMBER 54

(Joins sheet 47)

N

3 550 000 FEET

385 000 FEET

1 Mile

5 000 Feet

0 0

Scale 1:20000

1000 2000 3000 4000 5000

¼ ½ ¾ 1

(Joins sheet 53)

3 575 000 FEET

(Joins sheet 55)

(Joins sheet 60)

3 530 000 FEET

Caney

Creek

SAM

HOUSTON

NATIONAL

FOREST

Goodridge

Walters

Creek

Bayou

Creek

Rhodes

water

water

MITCHELL CEMETERY

Newlight Church

PACIFIC

MISSOURI

2296

75

1375

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 54

WALKER COUNTY, TEXAS — SHEET NUMBER 55

(Joins sheet 48)

55

WALKER COUNTY, TEXAS NO. 55

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(Joins sheet 54)

N

1 Mile 5000 Feet

Scale 1:20000

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

(Joins sheet 61)

WALKER COUNTY, TEXAS — SHEET NUMBER 56

56

N

1 Mile
5000 Feet
0
0
Scale 1:20000
¼
1000
½
2000
¾
3000
1
4000
5000

(Joins sheet 50)

3 450 000 FEET

365 000 FEET

(Joins sheet 57)

3 475 000 FEET

350 000 FEET

355 000 FEET

345 000 FEET

3 465 000 FEET

3 430 000 FEET

(Joins sheet 62)

(Joins sheet 57)

MONTGOMERY COUNTY

SAM HOUSTON NATIONAL FOREST

FARRIS CEMETERY

1791

This map is compiled on 1975 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 56

WALKER COUNTY, TEXAS — SHEET NUMBER 57

WALKER COUNTY, TEXAS NO. 57

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

3 455 000 FEET

365 000 FEET

(Joins sheet 56)

(Joins sheet 51)

57

N

West Sandy Creek

Sandy Creek

West Fork San Jacinto River

BOUNDARY

SAM HOUSTON NATIONAL FOREST

FOREST NATIONAL

MONTGOMERY COUNTY

(Joins sheet 58)

1 Mile
5000 Feet

0 0

Scale 1:20000

1 ¼ ½ ¾ 1

5000 4000 3000 2000 1000 0

355 000 FEET

3 475 000 FEET

(Joins sheet 52)

58

N

Scale 1:20000

1 Mile 5000 Feet

(Joins sheet 57)

3 500 000 FEET

370 000 FEET

355 000 FEET

3 480 000 FEET

(Joins sheet 62)

(Joins sheet 59)

SAM HOUSTON NATIONAL FOREST

BOUNDARY

NATIONAL FOREST

McDonald Creek

West Fork San Jacinto River

Stubblefield Lake

Maple Creek

Sandy Creek

East Fork San Jacinto River

Sandy Branch

Lost Meadows Lake

Smith Branch

Jib Lake

1374

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 58

(Joins sheet 53)

59

N

3 505 000 FEET

370 000 FEET

East Plum Creek

Sandy Creek

Stewart Lake

Plum Lake

SAM HOUSTON NATIONAL FOREST

Plum Creek

Smith Branch

water

Little Caney Creek

1374

45

(Joins sheet 58)

(Joins sheet 60)

(Joins sheet 63)

3 525 000 FEET

355 000 FEET

1 Mile

5000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS NO. 59

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS — SHEET NUMBER 60

60

N

(Joins sheet 54)

3 550 000 FEET

370 000 FEET

SAM HOUSTON NATIONAL FOREST

PACIFIC

Gourd Creek

NATIONAL FOREST BOUNDARY

GOURD CREEK CEMETERY

Unity Church

Water

Caney Creek

Little Caney Creek

MISSOURI

ST JOSEPH ELMINA CEMETERY

1375

2793

75

(Joins sheet 59)

(Joins sheet 61)

(Joins sheet 64)

355 000 FEET

3 530 000 FEET

1 Mile

5 000 Feet

Scale · 1 : 20000

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 60

WALKER COUNTY, TEXAS — SHEET NUMBER 61

61

N

3 555 000 FEET

(Joins sheet 55)

370 000 FEET

(Joins sheet 60)

SAM HOUSTON NATIONAL FOREST

NATIONAL FOREST

SAM HOUSTON NATIONAL FOREST

NATIONAL FOREST

HOUSTON NATIONAL FOREST

Boundary Creek

Gourd Creek

Winters Bayou

Boswell Bayou

Pursley Lake

water

WINTERS MEMORIAL CEMETERY

2778

COUNTY

SAN JACINTO

360 000 FEET

(Joins sheet 65)

3 575 000 FEET

1 Mile

5000 Feet

Scale 1:20000

WALKER COUNTY, TEXAS NO. 61

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS — SHEET NUMBER 62

62

N

(Joins sheet 58)

3 500 000 FEET

350 000 FEET

340 000 FEET

3 480 000 FEET

1 Mile

5000 Feet

Scale 1:20000

(Joins inset, sheet 56)

(Joins sheet 63)

SAM HOUSTON NATIONAL FOREST

LAKE CONROE

Smith Branch

Brown Branch

MONTGOMERY COUNTY

MONTGOMERY COUNTY

1375

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 62

WALKER COUNTY, TEXAS — SHEET NUMBER 63

(Joins sheet 59)

63

N

3 505 000 FEET

350 000 FEET

SAM HOUSTON NATIONAL FOREST

SAM HOUSTON NATIONAL FOREST

Moore Grove

Fivemile Branch

Gum Branch

Tassieller Creek

Caney Creek

Little Caney

New Waverly

MISSOURI PACIFIC

MISSOURI PACIFIC

(Joins sheet 62)

(Joins sheet 64)

340 000 FEET

3 525 000 FEET

1 Mile

5 000 Feet

Scale · 1 : 20000

WALKER COUNTY, TEXAS NO. 63

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(Joins sheet 60)

64

N

3 550 000 FEET

355 000 FEET

1 Mile

5 000 Feet

Scale 1:20000

(Joins sheet 63)

New Waverly

Chicken Creek

Rocky Creek

Caney Creek

HILL CEMETERY

HARDY CEMETERY

SAM HOUSTON NATIONAL FOREST

SAM HOUSTON NATIONAL FOREST BOUNDARY

MISSOURI PACIFIC

340 000 FEET

3 530 000 FEET

M O N T G O M E R Y

C O U N T Y

(Joins sheet 65)

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WALKER COUNTY, TEXAS NO. 64

WALKER COUNTY, TEXAS — SHEET NUMBER 65

(Joins sheet 61)

3 555 000 FEET

355 000 FEET

65

N

Hawthorne

JASPER CEMETERY

OLD WAVERLY CEMETERY

water

SAM

Branch

HOUSTON NATIONAL FOREST

Hegar

Peach Creek

COUNTY

SAN JACINTO

MONTGOMERY COUNTY

(Joins sheet 64)

1 Mile

5000 Feet

Scale 1:20000

340 000 FEET

357 000 FEET

WALKER COUNTY, TEXAS NO. 65

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.